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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

The Fishkill Direct-Acting Vertical Engine.

This engine, an illustration of which we present, was designed by the manufacturers, the Fishkill Landing Machine Company, Fishkill-on-the-Hudson, N. Y., for use in grain elevators, but is equally applicable for any purpose where for lack of room an engine of the vertical type is preferable, and with the necessary modifications, for freight and passenger propellers.

The bed-plate is of the box form, with main pillow blocks cast in. The A frames or housings are made with hollow cylindrical legs, which rest on the bed plate and support the cylinder at the top. The cylinder is fitted with the Loomis automatic cut-off valve. This valve is balanced, and while it gives ample opening, it closes without shock. It is under direct control of the governor, its connection with the latter being by means of a movable cam and tappet bar.

The Buckingham governor is used, for which it is claimed, that the manner of suspending the balls makes it nearly isochronous in its movements. The governor, which runs at exactly twice the speed of the crank shaft, is geared to the latter, and hence has positive control of the cut-off, uninfluenced by slipping or "creep" of belt. If from any cause the governor stops, the engine will also stop at once.

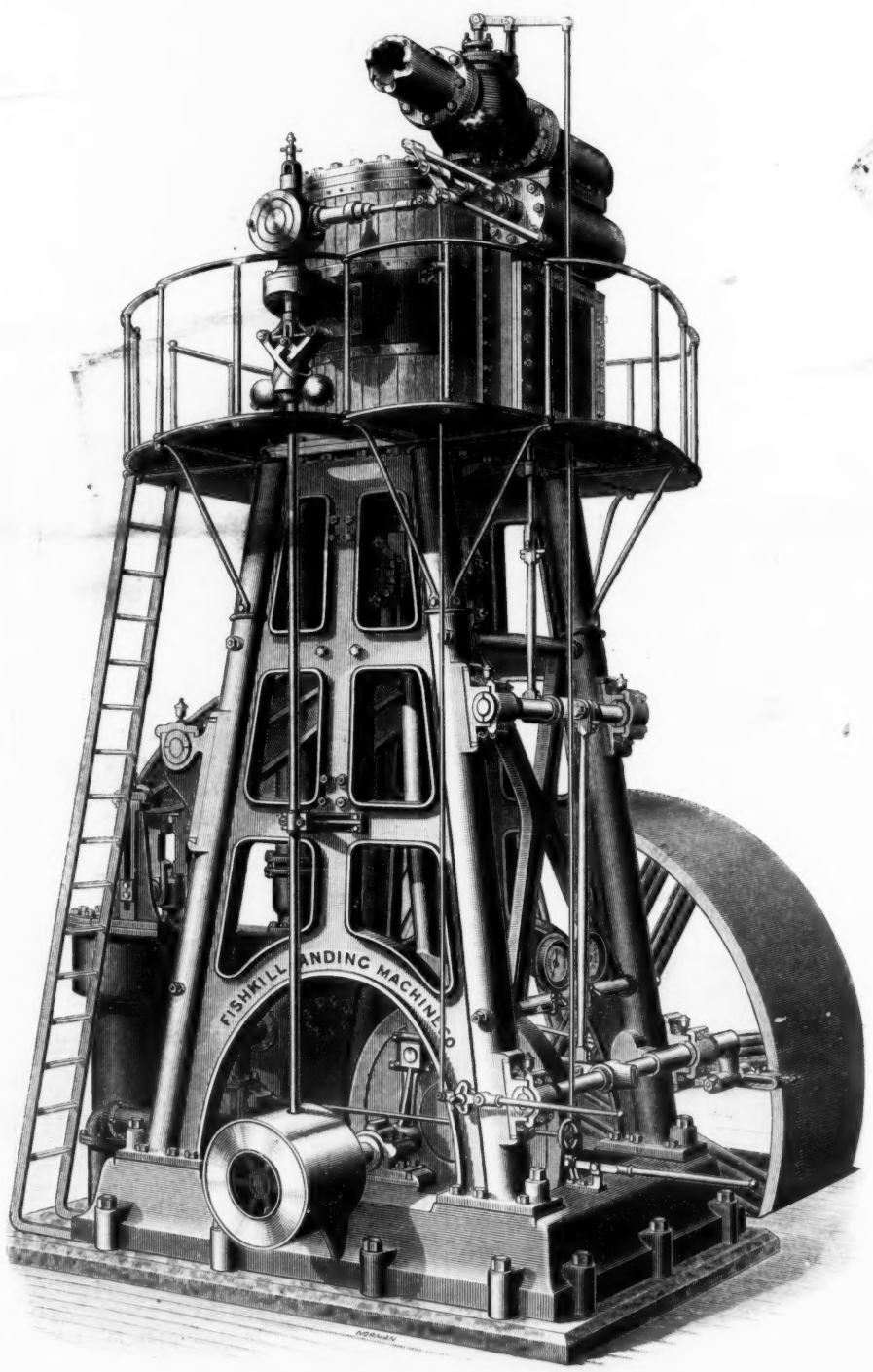
The engine is made either condensing or non-condensing. The illustration represents a condensing engine. The condenser and air pump are cast in one piece, which is fitted to the top of the bed-plate. An expansion joint is provided in the pipe from cylinder to condenser. The air-pump, which is single-acting, is driven from main cross-head by double beams which work a rock shaft, journaled to supports on A frames.

The piston-rod is forked at the lower end, the wrought iron cross-head passing through it, with the wrist pin between the blades of the fork. The guides are bolted to the A frames. The cranks are counterbalanced disks.

A fly-wheel separate from the driving pulley is provided, or a fly-wheel pulley, as may best suit the circumstances.

All connections to starting valve, injection, etc., are brought down to the floor, so that there is no necessity for mounting the platform in stopping or starting.

The engine is strongly built, with plenty of metal and large wearing surfaces. If preferred the Corliss valve gear is used in place of that shown.



THE FISHKILL DIRECT-ACTING VERTICAL ENGINE.

The estimated value of a workman's life in England is shown by the result of a recent trial there. Neglect to comply with the law by fencing in a horizontal shaft resulted in the killing of a boy, and it being shown that six persons had recently been killed in the neighborhood by similar accidents, the Court mulcted the proprietor in the sum of twenty-five dollars! It was probably cheaper to kill the boy than to protect his life.

Emery Grinding.

BY JAMES F. HOBART.

When a machinist has a job of emery grinding to do, he is pretty apt to sit right down and hate himself. Give him a dozen pairs of cast-iron die stocks to finish up, and he will take them to his vise, file them up and rub them down in good shape; all he needs is time, but he wants plenty of that.

Perhaps you have been on a visit to some hardware manufactory; the way they ground and polished iron and steel there made you open your eyes. You saw a boy in that shop finishing die stocks just like yours; you watched him with interest; he had two emery wheels and an emery belt. He would pick up one of these stocks, give two or three rubs, and a twist over his belt and wheels, and the job was done.

He was doing work at a cost of ten cents that you were getting fifty cents for, and it cost you that, too. You make up your mind then and there to have some grinding machinery. You buy half a dozen new wheels and take them home with you, mount them on the same frame with the old wooden buffing wheels; rig up two pulleys near them; glue some emery on an old belt, stretch it over the pulleys and you are all ready to "do some grinding."

The first thing you try your hand on is a cast-iron clamp box which you wish to finish up for a pattern. You start that new wheel, and when it gets up to speed hold the box to it.

After you have spit the dust out of your mouth and wiped your eyes, you look at that stone to see what ails it. It seems to run true enough, you think, but the box only touched once in every other revolution, and then the fire and dirt flew like hair in a dog fight.

What is the matter? Nothing much, only that stone runs too fast. You are not using a buffing wheel just now, and must not take it as a pattern. They have to run fast in order to melt or burn out the glue or tallow which holds the enemy in place.

Your stone has been running 3,000 revolutions per minute, enough to have torn it in pieces, and a dangerous speed for a 12-inch solid wheel. 1,500 feet per minute is about right, and that would be just about 475 turns per minute.

Take the stone off the buffer spindle. That runs on pivots or centers resting on blocks of maple wood, don't it? Put it on a good stiff arbor having well fitting boxes, and keep them covered from the loose emery that is flying about.

Better go where you bought the wheels and buy a machine all ready fitted. It don't pay to "carry coals to Newcastle;" you can buy a better machine for less money than you can make one for.

Solid or vulcanite wheels used to burst, and everybody got afraid of them. I should too, if I ran them 3,000 revolutions per minute.

To remedy this bursting tendency, manufacturers resorted to all sorts of dodges. Some put a web of metal inside the wheel, some filled it with coiled wire, and one almost demoralized solid wheels forever by filling the stone with radii of small iron wires set like spokes in a wheel. Don't put up with any of this nonsense; get a stone that is all emery, no iron wanted. It should have a lead bushing reamed to fit the arbor.

See that each stone is true upon the sides. No matter about the face—you can fix that at your leisure. If a stone "wobbles" sidewise it should be turned true before being used. The sides *must* be made slightly *convex*. This is what holds your stone from flying to pieces.

Turn the stone convex, and make the collars *fit the stone*, and have a diameter of two-thirds that of the stone. Put a layer of felt or thick cloth between collars and the wheel, screw up tight and try the box again. You can keep it on the stone now, and it cuts away the iron just as though it meant business.

You grind one side of that box, then you look at it once, but that once is enough; a hundred and fifty different facets, bevels and cat-faces, to say nothing of the lights and shades. It doesn't look much like the nice work that chap was doing on those die stocks.

You try a dozen times, but don't get a job to suit yourself. You call old Tom in from the foundry; he has run a wheel, and you let him try his hand. Tom has always regarded an emery wheel as a wobbling concern to grind off gates and copes with, and he gets a worse looking job than you did.

You get disgusted; the thing stands there

two or three months, and the boys pile up lots of work, and it costs lots of money.

One day a chap comes along looking for a job You don't need another man, but you like his looks and get to talking with him. He says he has been doing the emery grinding over in Blank's. "Can you do a good job?" you ask. The chap says he knows his business, and you take him into the shop, and have a boy sweep off dirt till you can see your grinding machine. Our chap looks it over and then looks at the boys draw filing die-stocks.

"Fix this machine up, and I can save you $20 a day."

"How much will it cost," you ask.

"Not more than $50; you have got everything here except buying half a dozen emery belts."

You hire the man for $2.50, and tell him that you will pay him $5 if he will do half he promises. That chap takes hold and cleans out a place around the machine. He works around the machine three or four days, and says he is ready for business. The wheels run so true you can hardly believe they are in motion. He has balanced them, balanced every moving thing around that machine, and even overhauled a countershaft that hung under the floor, beneath the machine.

You bring him the very box upon which your patience was wrecked. Five minutes is all the time he uses upon that job. When he lays it down on the floor it is smooth. It looks just as if it had been dipped in a bucket of "smoothness," and came out all covered with it.

He seems to do it just as you did, but there are no cat-faces there when he is done. What is the secret then? There is no secret, only he knows how. He doesn't grind one spot, and then shift to another, his work is always moving, the stone always cuts a moving surface. The planes are blended, not left distinct. A bad place gets ground out, but the grinding is not all done on the spot itself; all around that place he grinds, guided wholly by his eye and keeping the general shape.

He can leave the corners as sharp as he pleases; he doesn't "smutch" them off and make them look like a cocked hat, they come out neat and clean, and look well. What a lot of work you can pile around this man. He never is in a hurry, but the work is done before you know it.

You bought a diamond for him the first day he was there, and he is not afraid to use it. Just as quick as a wheel is out of truth, enough to be perceptible, he trues it up.

If he gets hold of a hard stone, or one full of hard places, you find it out right away, and that poor stone ornaments your desk until you change it. He tells you to pick for soft looking stones, get the brownish looking ones, but let alone those that look "muddy" or "flinty."

A stone that you can cut with your pocket knife, or rather scrape off the particles of emery, is better than one where the emery comes off in powder when scraped very hard.

Soft spots in a stone he doesn't like, but will put a little oil on them which prevents their wearing out too fast. If he gets on too big a spot of oil, it spreads around the soft spot, and he will kick that stone out in a hurry.

Six months after you have had a grinder, you wonder how you ever got along without him. He does work that you never thought of in connection with an emery wheel. He saves his wages twice over in files alone.

Don't try to have him teach the boys how to grind. If you do the whole business is spoiled. Let somebody else use the wheels and they are out of tune at once. If everybody had a hand at the emery wheels they would always be where they were when you ground cat-faces on that clamp-box.

Emery grinding is just like gear-cutting, or carving. Man and machine have got to be in sympathy, and "both jump together."

It is the same with emery grinders as with every other machine, viz.: What is "everybody's machine is nobody's care," and will soon be like the centering machine in a job shop, a combination of "vicious stupidity," and not worth oiling.

Emery grinding for sharpening tools is just coming into use. The old-school boys kick heartily, as they always do when anything new is on deck. It takes care to grind a tool on the emery wheel. It won't do to think of a grindstone when you are using emery.

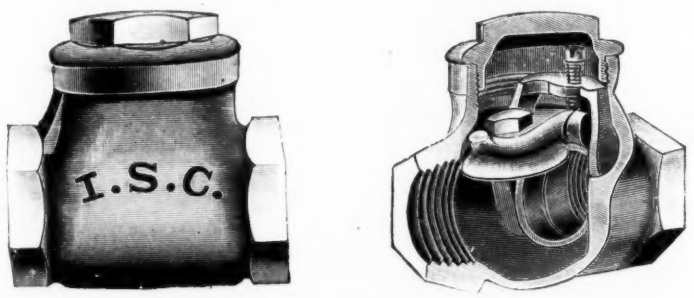
If you don't mind your business pretty sharp, the temper will sneak out of the corners.

You do not have to put half your weight on a tool to make emery take hold.

Get the "hang" of it, and you will never go back to the nasty, wet, unscientific grindstone, which has been a very useful tool in its day, but compares with the emery wheel as the stage-coach compares with a Pullman car.

Improved Swinging Check Valve.

The improvement in the check valve illustrated herewith, over similar valves previously made, consists in making the seat removable instead of in one piece with the body of the valve. The part on which the seat is formed, and to which the disk is hinged, is held in position by two projecting ribs cast in the body, and a wedge-shaped yoke, the latter being forced and held down by the cap screw. When it is desired to remove the valve and seat, it is only necessary to unscrew the cap, then a turn or two



IMPROVED SWINGING CHECK VALVE.

of the small machine screw will raise the wedge, leaving the wedge, seat and disk free to be taken out. This feature permits the removal of the disk and seat for grinding without disturbing any connections, or the worn disk and seat may be removed and new ones substituted (which are furnished in duplicate at small cost). By this last-named plan no delay of consequence will occur—sometimes a matter of considerable importance.

The disk and seat making only a small part of the total weight can be made of hard metal, and of strength to avoid springing, without very materially increasing the cost. The seat being separate from the body, is not sprung by screwing up pipe and making connections.

As will be seen, the valve disk is not in one piece with the clapper, but is connected to it in such a way that it is free to move in either direction to seat fair.

This valve may be used either horizontally or vertically, the seat being at such an angle that the disk will find its seat by gravity in either case. When the valve is opened it provides a free straightway opening, the full size of connecting pipe.

In the construction there are no outside screws to leak, or to be lost in making changes.

The general agent for the sale of these valves is A. Aller, 109 Liberty street, New York City.

The New York West Shore and Buffalo Railway is having deplorable experience with collisions, land slides, and other misfortunes, and now it is reported that their depot at Weehawken is in danger of falling into the Hudson River. The piling on which the structure rests is sinking so badly that the building is strained and racked out of shape. The piles next the water have settled about three feet downward, and nearly as far horizontally towards the water. Every move downward and outward results in breaking the pipe connections within the building, and plumbers and pipe fitters are having a busy time keeping the water and gas connections repaired.

Scraps—No. 5.

BY J. G. TRAMIS.

I am the owner of a good many books, the most of them mechanical works, which I know to be fairly good, as I have read them all, and some of them several times. They are of but little use to me now, and I have been debating as to the best thing to do with them so they may be of use to some one else. A friend, who is a member of the American Society of Mechanical Engineers, suggests that, as they are about to establish a library, I donate them to that Society. Not being a member, and not being a believer in the wonderful merits of a library, I don't enthuse in that direction, particularly after figuring the thing out, which I do about thusly: Assume the Society to have 500 members now, and that it will have 1,000 in ten years, or for the next ten years, and thereafter, an average of 750 members. Assume that one-third of that number, or 250, visit New York every year; that one-third of that number visit the office of the Society, and one-half of those consult the library, or twenty-five people, in good, round numbers, every year. It certainly would not be a very large collection that comprised but 2,500 volumes, of which mine would be about the one twenty-fifth part. According to this rating, my books would stand an even chance of being of some use to some man once in a year, and they are of quite as much use as that now.

This brings up two thoughts: Is there no better use to make of books than to mass them in a library, and aside from the glory of the thing and the fun of gratifying the sight of the "book-worms," who delight in the sight of a display of volumes, is not the real value of a great library entirely overestimated.

The claim is that by collecting the books they are preserved, when otherwise they would be worn out.

Is there any use in preserving a thing that is never to be made use of? And was there anything that ever happened to a book better than to have it worn out by use?

I am thinking strongly of breaking up my whole collection, and giving it away, one book in a place, wherever I can find a good mechanic or inquisitive apprentice. Is it not probable that it will do one hundred times more good than to stow them away in a library? This plan will at least insure one thing, that is, that the recipient will get but one book at once, and this is something that every mechanic ought to bear in mind, viz.: that he should never buy but one book at a time, and never get another until he has the first one read through. Rich men may as well invest in a large collection of books as in anything else, but the mechanic had better buy his books as he does his tools—for use.

The Dickson Manufacturing Company, Scranton, Pa., has established a reading room for employes, provided with current newspapers, daily and weekly, including about all the mechanical and engineering papers. It is used very freely by the workmen. When running full this company employs 1,100 men.

A New Excavator.

The Osgood Dredge Company, of Albany, N. Y., has just completed an excavating machine, differing, in some respects, from anything of the kind yet made. It was built for the Pacific Guano Company, to be used in the phosphate industry at Pacific Island, Bull River, S. C. The phosphate is from eight to fifteen feet below the surface, and the excavator is to be used to uncover it. The excavating machinery is arranged on a car which rests on four 33″ wheels, two near each end of the car; also on four 24″ wheels, which are under a turn-table at the center of weight; upon this turn-table the car may be turned around. The 33″ wheels are on axles situated 29 feet apart. The wheels under the turn-table are on axles 7 feet apart. The gauge is 7 feet, so that the wheel base under the turn-table is square—7 feet each way. All the axles are of hammered steel, 5½″ diameter, with journals both inside and outside of wheels. The main framing of the car is of timber, 18″ deep, strongly trussed from above.

The car turn-table is remarkably strong, being made of heavy 14″ rolled I beams, bent and riveted to a circle 12 feet diameter, and further strengthened by rolled beams across inside the circle for supporting the inner axle boxes. Between the top of this turn-table and the bearing plate on the bottom of the car are 60 rollers, on which the latter is turned.

The boiler and water tanks are at the rear end of the car. The former is of the vertical type, 4½ feet diameter and 9 feet high, and is provided with a steam pump and an inspirator for feeding. Just forward of the boiler are a pair of 10″×12″ horizontal engines, geared 13 to 1 to the hoisting and swinging drums; these drums are controlled by friction clutches that work remarkably easy and smoothly.

The crane turn-table is of iron, and upon it are a pair of 6″×8″ link engines for "forcing" or "thrusting" the dipper.

The **A** frame and crane boom are of iron, made up of appropriate rolled sections. The dipper handle is also of iron, made of channel bars united with plates. The dipper is of steel, with the Osgood two-part bottom. It has a nominal capacity of 1¾ yards, which gives an actual working capacity of about 2 yards.

In addition to the eight wheels mentioned, the car is further sustained, while at work, by three heavy jack screws, one located at the front and center of car and two at the sides, just back of the crane turn-table, or between the crane and car turn-tables.

These last two jack screws are 20 feet apart, on a heavy timber, extending across the car under the feet of the **A** frame, this timber being strongly trussed and braced to the car timbers. These three jack screws, their points resting in broad-bottomed steps, form a triangular base; and in working take—the one in front the thrust on the crane boom, and the two at the sides the downward angular thrust on the members of the **A** frame. They also, of course, extend the working base, giving the necessary increased stability.

In operation, the machine rests on track, tied together in sections, and moves along in excavating, as fast as it passes a section of track it being moved to the front. It will cut a channel 25 to 35 feet in width, and down to the phosphate. The material removed will be thrown all to one side, making a continuous bank as the machine moves along.

If necessary, the machine will deposit the dirt at the top of a bank from 25 to 30 feet above the track. As the channel is dug the phosphate is removed. After digging to the end of the "field," shoes are placed on the track, so that the four wheels under the turn-table will run upon them, raising the large wheels clear of the track, all the weight then resting upon the turn-table. Then the car is turned so as to move back, digging another channel beside the first one, the material being deposited in the channel from which the phosphate has just been removed. This operation is repeated,

giving the ground the appearance of having been plowed with a gigantic plow.

The main features of the machine embrace the improvements made in dredging and excavating machinery by the president of the company, R. R. Osgood. One improvement by Mr. Howe, the secretary and treasurer of the company, we should suppose would be of considerable value. In two chain machines of this class the dipper is raised by the operation of both drums and chains; then, to swing, one drum is stopped, when the motion of the other chain under and against sheaves at one side of the turn-table turns the latter. In some positions of the dipper the friction of the chain is insufficient to satisfactorily turn the table. Mr. Howe's improvement consists in a friction device for each of the chains, so that by moving a lever the dipper tender can at will throw additional friction on either chain to assist in swinging.

Throughout, the machine is strong in construction; all chains are of 1″ links. In the guys from top of **A** frames to boom is a 20-ton spring, which greatly modifies the strains transmitted to the various parts.

The Lidgerwood Manufacturing Company, of Brooklyn, furnished the boiler and engines, and the machine was under steam at their works last week.

The Nagle Force Pump.

In this pump a novel plan is adopted for providing crank motion with all its parts outside and always open to inspection, and with connections of only moderate length. As will be seen by reference to the engravings, two cranks are used, which by means of the geared connections are always made to act exactly opposite each other. This gives a correct reciprocating motion, with no tendency to side thrust on the plunger, and is equally applicable to either single or double-acting pumps, no cross-head or equivalent device being required.

The pump is of the chamber and plunger type, which permits the dirt and grit to settle away from the plunger. The end of the plunger is rounded, which is found to work with less shock than when left square, as the water fills in around it better.

The valves are of the well known Pratt & Cady type, which give straight water-ways.

These pumps, when used for purposes where the water supply must be regulated, as for feeding boilers, are provided with a "by pass;" by this the feed can be regulated, or entirely stopped, without stopping and starting the belt.

The frame is of the box form, neat and strong; the gears are machine cut, and in all details and in general design the machine is a first class one of its kind.

It is made by A. F. Nagle, Chicago, Ill.; sold in New England by Hill, Clarke & Co., Boston, Mass.

Inventing Spark Arresters.

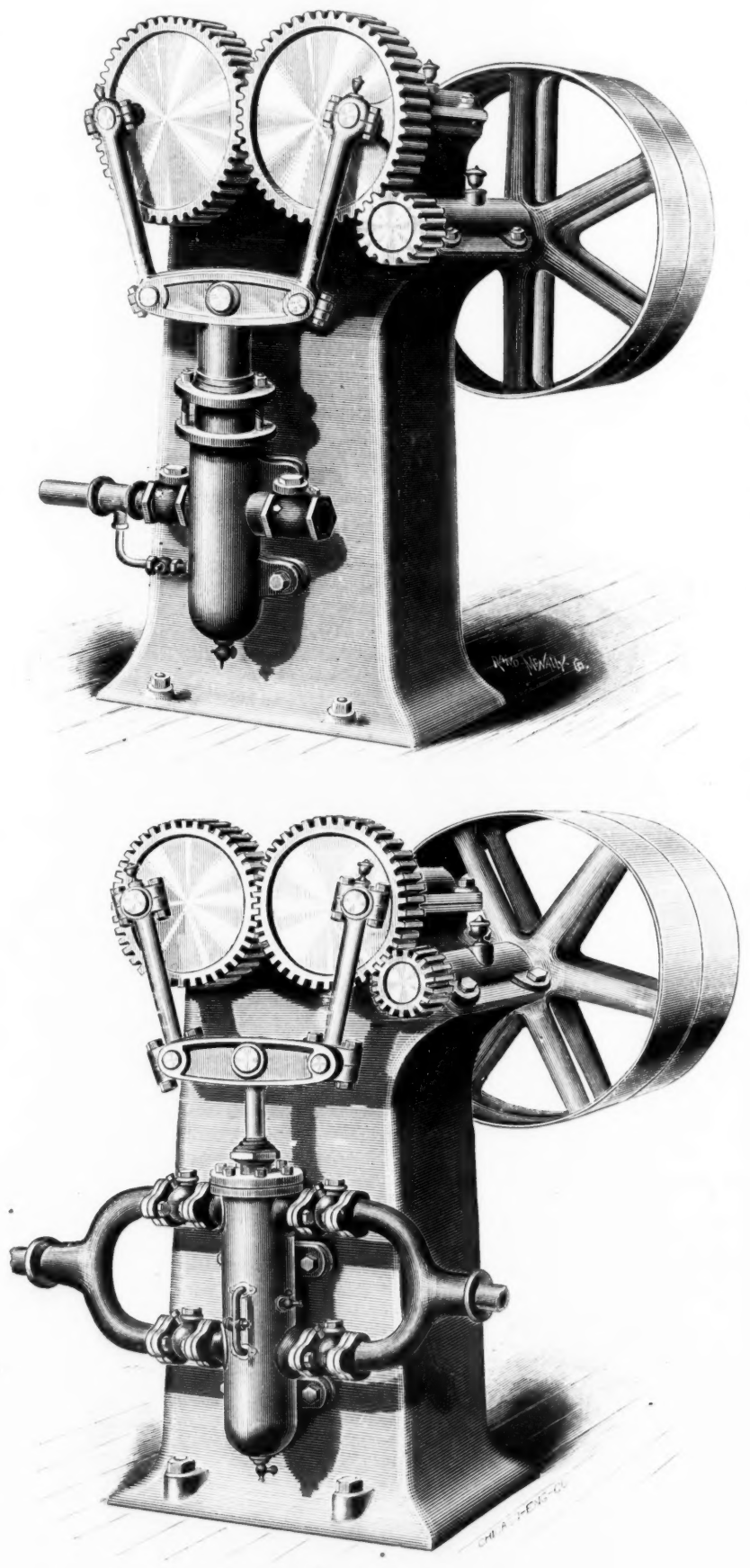
A brother of George Westinghouse, Jr., a year or two ago, designed a spark arrester for an agricultural portable engine, and it has worked very satisfactorily in practical use. Mr. Westinghouse conducts agricultural machine works in Schenectady, N. Y., and he had good opportunities of perfecting his invention by adding the modifications that practice indicated to be necessary. His success in this line has made him ambitious for triumphs in wider fields, and he concluded that he could equip a locomotive with an appliance that would entirely prevent throwing of sparks. Some time ago he borrowed a locomotive from the New York Central to experiment with, and he is now striving to solve the problem he has undertaken, but he finds that controlling the throwing of sparks by the strong blast of a locomotive, is a much more difficult matter than he supposed it to be. We understand the line Mr. Westinghouse is working on is to catch the sparks in the smoke-box by means of a series of plates which perform the functions done by the cone in the diamond stack.

American Locomotives Built in 1884.

BY ANGUS SINCLAIR.

INFLUENCE OF THE STOCK MARKET ON RAILROAD MANAGEMENT.

The year 1884 witnessed marked depression in all departments of business, but it is doubtful if any class of manufacturers have experienced want of orders so keenly as those depending on railroad companies for patronage. If railroad managers were permitted to carry on their business in the manner well-managed private firms are conducted, they would take advantage of seasons of depressed trade to prepare their structures and machinery for the heavy traffic of coming busy times, by judicious expenditures, that could then be economically made, when labor and material were cheap. This they are not allowed to do. The tyranny of the stock market compels the majority of railroad managers to stop all expenditures that can possibly be avoided so soon as depression of business intervenes, this unwise course being pursued in order that a slightly better report of net earnings may be obtained. In many cases this policy enormously increases the ultimate expense of operating and repairs.



THE NAGLE FORCE PUMP.

BUILDING WORK OF THE YEAR.

During last year, the curtail-at-any-expense policy has been dominant, and locomotive builders have suffered severely from its effects. During the year 1883 seven of the largest locomotive builders turned out 1,346 locomotives, and last year the work done by the same builders was represented by 901 engines, which indicates a falling off of over 33 per cent. There are 16 locomotive building shops in America, and three of them have ample capacity to construct all the locomotives that were bought by railroad companies last year. The parties who contemplate putting money into new locomotive works, might find this fact worthy of consideration. Several of the builders have declined to say anything about what they are doing, but ten have given their output, which aggregates 1001 locomotives great and small. From the data received from railroad shops, there is reason to believe that building new locomotives for themselves has been practiced rather more largely by railroad companies in 1884 than it was in the preceding year. Figures at hand indicate that about 250 locomotives were built in locomotive shops, and if 20 is allowed for each maker whose output was not obtained —which is a liberal average—the whole production of locomotives in the United States during 1884 is 1271. About one hundred engines in this quantity were for exportation.

FAVORITE TYPES AND LINES OF IMPROVEMENTS.

The tendency of railroad companies as indicated by the engines built last year, is to employ heavy locomotives with more than four wheels connected. One builder who put up 73 engines had 16 Standard eight-wheel passenger engines, 11 Moguls, 19 ten-wheel engines, 7 consolidation engines, 5 switching engines, 2 mine engines, 1 passenger four-wheel narrow-gauge engine, and 12 Mogul narrow-gauge engines. This can be accepted as a fair estimate of the locomotives being turned out in other shops. While engines larger than those of the familiar 8-wheel type are in growing demand, there is a decided drop in the percentage of consolidation engines built last year compared to the year before. There is a growing impression among many railroad men, that a ten-wheel, or Mogul engine, can haul all the cars on a tolerably level road that may be safely put in one train, and that heavy consolidation engines are only adapted for working heavy grades. This opinion appears to materialize in the decreased demand for consolidation engines.

DECLINE OF THE NARROW-GAUGE.

A striking feature about the locomotives built last year, was the small number of narrow-gauge locomotives represented. Narrow-gauge railroad companies are feeling the pressure of hard times peculiarly onerous, or they have not faith enough in the stability of the system to increase the rolling stock that will be useless when standard gauge is adopted.

IMPROVING DRAFT APPLIANCES.

In all quarters master mechanics manifest a desire to increase the economical efficiency of locomotive service, and new engines are equipped with every improvement likely to promote this. Steel for boilers is becoming almost universal, and boilers are being steadily increased in size, and the tendency towards higher pressures goes on. Enlarged heating surface enables engines to be run with enlarged exhaust nozzles, which reduces the speed of the gases of combustion, securing increased absorption of the heat. The extended front end is making rapid headway, and in connection with that arrangement many master mechanics are striving to harmonize draft appliances so as to admit of still increasing the exhaust nozzle opening. Mr. Buchanan of the New York Central Railroad is making the smoke-stack casting bell-mouthed and using a single nozzle, his idea being to obtain maximum efficiency of the exhaust steam to promote draft, by making the nozzle and stack conform in principle to an injector. His experience has been very encouraging. Mr. J. M. Foss, Superintendent of Central Vermont Railroad, Mr. James Mecham, Cincinnati, New Orleans and Texas Pacific Railway, Mr. R. W. Bushnell, Burlington, Cedar Rapids and Northern Railway, and others, have been laboring in lines of their own to improve the draft appliances with gratifying results.

POPULARITY OF THE SOFT COAL BURNING LOCOMOTIVE.

Anthracite coal-burning locomotives are on the decrease, for there seems to be a growing impression that bituminous coal can be burned without being offensive on any kind of trains. The practice that came in vogue with hard-coal burning locomotives of placing the fire-box entirely above the frame to secure a wider grate and increased width of fire-box is receiving considerable application with soft-coal burning engines. The Schenectady Locomotive Works alone built 13 locomotives with the fire-box constructed in this way. If this plan is found to work

as well in practice with burning soft coal as it does with hard coal, it seems susceptible of considerable improvement. The boiler could be elevated till its center is about the height of Wootten boilers which, would give fair depth below the tube line. Mechan has elevated his boilers in fast passenger engines, merely to secure increased steadiness in running, a somewhat anomalous result produced by elevating the center of gravity; and there is no reason why it should not be made the most of when a better fire-box is the object sought.

NOVEL LOCOMOTIVE BOILERS.

The desire to improve on the ordinary locomotive boiler has led to several experiments during the year where novel types were brought into service or radical changes were made on old ones. In June last the Brooks Locomotive Works finished an engine for the Chicago Coventry Locomotive Boiler Company. This engine is of the Brooks eight-wheel standard type, but it has a return-tubular boiler covered by the Coventry patent. The boiler, which is a very large one, being 60 inches diameter at the smallest ring, is divided horizontally into two compartments, both being nearly filled with tubes. In the lower part are 150 two-inch tubes which convey the gases from the fire-box to the smoke box; and the upper section has 80 three-inch tubes which lead the gases back from the smoke-box to the stack, which is placed on top of fire-box in the position usually occupied by the steam dome. This engine has been running on the Chicago & North Western Railway and on the Chicago, Rock Island and Pacific Railway; and the owners claim a substantial saving of fuel, but a published letter from Mr. Twombly, general master mechanic of the latter road, shows the justice of the claim to be exceedingly doubtful.

Mr. A. J. Stevens, general master mechanic Central Pacific Railroad, has designed and built a locomotive boiler with a combustion chamber in the middle of the tube space. Tubes 4 inches diameter lead from the fire-box to the combustion chamber, from whence the gases are conveyed by a large number of $1\frac{1}{4}$-inch tubes to the smoke-box. Mr. Stevens' idea is, that the large tubes, which the gases of combustion enter first, do not suppress combustion, that the flame which would be immediately extinguished on entering a 2-inch tube keeps burning in the large tube and the act of combustion is completed in the combustion chamber. The boiler in service has given remarkably good evaporative results, besides throwing no sparks.

Mr. Buchanan, superintendent of motive power and machinery of the New York Central Railroad, has put his water-table fire-box into the greater part of the engines built for the road during the year; and he has improved the combustion by adding pipes for super-heating steam which is used to inject air upon the fire.

IMPROVEMENTS ON VALVE MOTION.

An examination of improvements effected on locomotives during the year indicates that master mechanics are not entirely contented with the ordinary link motion as a means of distributing steam. Several notable attempts to devise a reversible valve motion free from the objectionable features of the link motion, have met with practical application. First among these may be placed the Stevens valve gear. With this motion, one eccentric is used, and the lead is taken from the cross-head. Two slide valves are employed, one at each end of the clyinder, and they are operated by separate stems which connect with a wrist plate. The leading advantage of the motion is, that, when the engine is cutting off short, release can be delayed till close to the end of the stroke. For freight engines and others with comparatively slow piston speed, the gear is found very economical. Indicator cards taken from engines having this motion, show remarkably small back pressure when release is delayed beyond 90 per cent. of the piston stroke.

Mr. Alexander Mitchell, superintendent Lehigh Valley Railroad, fitted up an engine which was built last year with a peculiar valve motion, the invention of Mr. George S. Strong, Philadelphia. This engine has a steam-jacketed cylinder; and the steam is distributed by means of four independent gridiron valves that operate vertically on seats at the ends of the cylinders. The steam and exhaust valves are worked separately, and are so operated that admission, cut off, exhaust and compression can be regulated for the work the engine is doing. The valve motion resembles the Joy gear, the movements being taken from the vertical and horizontal action of the main rod. Two reverse levers are employed, which can be used together or separately, as there are two quadrants. The engine met with a serious accident which destroyed one of the cylinders shortly after she was first tried. Owing to this the engine has not done enough work to demonstrate her economical value.

Many master mechanics are improving on the plain slide valve by adopting the Allen valve, especially for passenger service. Balanced valves of different kinds have also been put on many locomotives during the last year.

NEW KINDS OF LOCOMOTIVES.

Apart from the novel forms of boilers, already mentioned as having been introduced during the year, a few other modifications that entailed changes from ordinary types have been introduced. Mr. Mitchell, of the Lehigh Valley Railroad, the inventor of the consolidation locomotive, has built, for working steep grades, some heavy engines that have eight drivers connected, and a pony truck in front and behind. The arrangement gives a fine distribution of weight on the drivers, with a rigid wheel base three feet shorter than would be necessary with a consolidation engine of the same size. The same prolific designer got out a neat and convenient form of double-ended, single-driver locomotive intended for inspection purposes. Mr. Stevens, of the Central Pacific Railroad, has got his long spoken-of huge "Mastodon" ten-wheel connected engine in service, and she is doing excellent work. Although the wheels are placed so close that the tires nearly touch each other, there is a total driving wheel base of 19 feet 7 inches, but the rigid wheel base is 5 feet less, which enables the engine to track well on sharp curves.

The Cooke Locomotive Works have built a group of ten-wheel engines for the Elmira, Cortlandt and Northern Railroad, which have the four-wheel truck in front of the cylinders—a style that is very common in Europe, but is a novelty here.

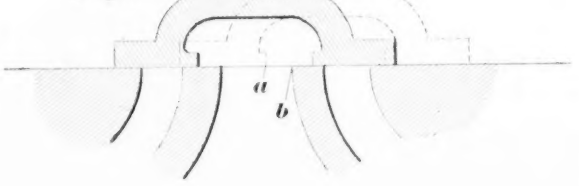
The Mason Locomotive Works, which have been in the habit of building suburban and narrow-gauge bogie engines with Walschaert motion, have changed to the link motion. Respecting the business of these works, Mr. Meats, the superintendent, writes: "We have built an unusually small variety of locomotives during the past year, made up almost entirely of the standard type. Of these we have constructed from 18″×24″, 96″ drivers, for heavy passenger work, weighing about 100,000 lbs., to 17″×22″, weighing about 76,000 lbs., and have in process of construction at present some 17″×22″, with 69″ drivers, for passenger work, to weigh about 90,000 lbs. when in running order. We have also constructed some 17″×24″, with 63″ drivers, for mixed service. "For passenger work we have wholly used the straight stack and extended arch, some of which have been fitted with a steam jet to expel the sparks from the smoke arch, and some have been fitted so as to drop them into the pit. Krupp steel has been used considerably for tires, piston-rods and crank-pins, and in some cases for axles. We are now about to secure truck tires by means of his retaining rings and bolts on a special order. Steel boilers, according to present indications, will be the rule rather than the exception for new work. Amongst the bogie engines we have constructed, I may mention a 16″×24″, with 57″ drivers, weighing 56,000 lbs. on drivers and 10,000 lbs. on pony truck. This engine, as you would suppose, has developed a high hauling capacity for its size, and excellent results in speed on local passenger work, the chief causes of its success being the free scope for a large grate area and the comparatively small amount of dead weight, together with a minimum resistance upon curves."

TOTAL NUMBER OF AMERICAN LOCOMOTIVES.

The most reliable official figures that can he found show that there are 29,227 locomotives of all kinds belonging to the railroads of North America. Reckoning the life of a locomotive at twenty-five years, it ought to require the construction of 1,169 locomotives annually to maintain the stock of engines. A great many locomotives kept on the motive-power list are doubtless out of service; but, making free allowance for this, the figures indicate that in the last year the renewals of locomotives have been far below the necessary requirements. Many of the engines built do not represent maintenance of stock, but were called for by new roads and extensions. Renewals must be made some time to fill the blanks left by wear and tear; and those who delay longest in getting their motive-power put in order will pay heaviest for the work when it can be delayed no longer.

Fig. 1

Fig. 2



LETTERS FROM PRACTICAL MEN.

Effect of Reducing Exhaust Passage.

Editor American Machinist:

Mr. Frank Hill (Dec. 27) says that he made considerable saving in the amount of coal burned, by cutting out inside lap of valve and places the result to the general principle that an "engine works better with no inside lap on the valve."

I think that there is a very simple explanation of it, if the case noted by him is what I take it to be from his description.

Some time since I had occasion to take some indicator diagrams from a small throttling engine, which were like the one shown in Fig. 1. At about the middle of the return stroke the back pressure came up to some 20 or 30 pounds, falling again towards the end of the stroke. Both ends of the cylinder showed the same defect. The cards were quite puzzling at first, but the result proved to be due to faulty construction of the exhaust port. In this case, when the valve was at its extreme travel, as shown by the dotted lines in Fig. 2, the inside edge *a* of the valve came so near the edge *b* of the exhaust port as to seriously contract the exhaust area, causing the increase in back pressure shown in the diagram, which fell again as soon as the valve had moved back to give full opening. It is obvious that cutting out inside lap would materially assist the working of the engine by relieving the back pressure, but the same result could be obtained by widening the exhaust port at the expense of the bridge.

C. L. REDFIELD.

Water-Line Glasses Breaking—Pulverizing Glass.

Editor American Machinist:

"J. U.," December 6, complains about his water-line glasses breaking after being cleaned. I have been troubled a good deal that way. I never put them into a bucket, but took a piece of iron wire and a piece of waste. They would almost invariably break within 24 hours. I use a stick now and have no trouble. I have noticed the same trouble with lamp chimneys. The boys stuff paper into them and rub it around with a file. The chimney is sure to break, and they learn to use wood instead of steel. I have always looked upon it as rather an "old maid" notion, but the chimneys and tubes break all the same. Perhaps the iron or steel and glass kick up some disagreeable electrical conditions; who can tell?

Mr. Charles S. Beach, December 27, writes about pulverizing glass for grinding in a valve. Mr. Beach gives the details in good shape, but forgets to tell how the glass took hold of the valve.

A very good way to pulverize glass, is to heat it red-hot, and then throw it into cold water. This cracks it in ten thousand directions all at once, and it will crumble up. Run it through an old coffee mill and you can make it as fine as you wish. There should be a mill in every blacksmith-shop for grinding borax, which goes much further when pulverized.

There are lots of the descriptive artists mentioned by Mr. Beach, who make a single crooked line, and then begin to talk about it, and they are generally all talk. They will talk about a job longer than it would take to do it, and they can't find the best way then.

JAMES F. HOBART.

Performance of Coventry Boiler.

Editor American Machinist:

Will you please allow me to correct a false impression which might be made by Mr. Coventry's article on the "Performance of the Coventry Boiler" in your issue of January 3.

The 1,470 miles on freight service spoken of is in reality only 1,400 miles, he having added 5 per cent. to the mileage for switching, etc., as is customary on a great many roads. Deducting this 70 miles, the miles run to one ton of coal are 32.56, instead of $34\frac{1}{8}$.

The record of coal for this 1,400 miles was not kept with great accuracy, being estimated in the chutes as is our usual practice with our own engines.

We gave this engine a comparative fuel test, running her against our engine, No. 291, for 600 miles, carefully weighing the coal to each engine, and having them pull trains of as nearly the same weight as possible.

Our engine used 32,450 pounds of coal equal to 36.98 miles to a ton, and the Coventry engine used 36,100 pounds, or 33.24 miles to a ton, falling behind our engine 3.74 miles to a ton, or using 11 per cent. more coal in doing the same work. With the record of this test at hand, it is hard for me to understand how Mr. Coventry can think that his engine has saved $13\frac{1}{2}$ per cent. of fuel over the record of other boilers, and that, all things being equal, she will save 20 to 30 per cent. of fuel.

The average consumption of coal in the freight service on this division of the Chicago, Rock Island & Pacific Railway for the month of September is given as $30\frac{1}{8}$ miles to the ton.

The principal reason for this low mileage is that the great majority of our engines were built from 8 to 12 years ago, and are very light engines, 16″x24″ cylinders, 47″ boilers, and weighing under 32 tons. A few are even smaller than this.

These engines are always loaded more heavily in proportion than heavier engines,

and the number of miles made to a ton of coal is always smaller.

Were all of our freight engines as large as the Coventry engine, our mileage per ton would be very much larger.

Our No. 291 is an ordinary eight-wheeled 17″x24″ engine, with boiler 50″ diam.

The Coventry engine has the advantage of being several tons heavier, a 60″ boiler and 300 square feet of heating surface more than the 291.

T. B. TWOMBLY,
General Master Mechanic
CHICAGO, Ill., C. R. I. & P. Railway.

Foundry Foremen's Blunders.

Editor American Machinist:

In reference to an article in your issue of Nov. 1, on "Skilled Workmen as Foremen," I will endeavor to describe the ideas of a few mechanical lights that I have met during my experience as a pattern maker.

While working for a firm manufacturing chilled car wheels as a specialty, it was found that wheels from a certain pattern came out too heavy. To get rid of this extra weight it was necessary to reduce the thickness of pattern at *A B*, Fig. 1, which, owing to the pattern being in constant use, had to be done quickly. To accomplish this it was only necessary to increase the thickness of core *C*, which, by increasing depth of core-box, could be done in about two or three hours. To this, however, foreman of foundry had his objections, replying, as nearly as I can recollect:

"John, I don't want you to touch that core-box; that box is right, because the core fits the mould. You know that the core is the most essential (here his fist came in contact with the drawing-board), as it has to go into the mould, and when the core fits like this one does, you don't want to touch it, but make your pattern to suit. What you want to do is to chuck the pattern in lathe, and face it off on both sides."

According to his views, it will readily be seen that by turning off the face of wheel new ribs would have been required, which it would take about three or four days to make, as those upon pattern previous to turning would have been useless, owing to change of curve of wheel. He also intimated that core-boxes should always be made first, because, when they are right it is an easy matter to make the pattern.

I could enumerate several blunders of this individual, but the above is sufficient to show that it is not always a skilled mechanic who is foreman, yet this man was considered first-class, a man of brains, and getting a good salary.

On one occasion it was desired to make a number of castings, as per Fig. 2. Instead of making pattern as per drawing, which called for $\frac{3}{4}$″ metal. *D* and *E* were tapered, as shown in sketch, the idea being that it would be easier to mould (which of course cannot be disputed), but the most weighty matter brought into consideration, and which undoubtedly caused the tapering sides *D*, *E*, was, that in pouring the mould the casting would strain so as to give an even distribution of metal.

The result in making a casting from pattern (Fig. 2) will be seen in Fig. 3. There being comparatively a small amount of metal at lower edges of sides *D*, *E*, and a large amount at top of casting, the lower edges of *D*, *E* will cool and shrink first, and while top part of casting is finishing shrinking, it must also draw the casting out of shape, as seen in sketch.

To keep the casting straight—after a good deal of discussion between foreman of pattern shop and foundry—it was decided to place a rib on inside of *E*, as per dotted lines in Fig 2, and in order to get this rib out of the mould, it was made in two lengths, each length about 12″ longer than pattern, so as to project through each end of the flask to able the moulder to catch hold of rib and pull it out lengthways by main strength. Here labor was materially increased, with very little improvement in casting.

I have made an effort to illustrate the *modus operandi* of pulling rib out of mould.

Had the pattern in the first place been made with just enough of taper to draw —say $\frac{1}{32}$″—the casting would probably have been practically straight.

It occurs to me that the practice so common among moulders, of shaking out the flasks while iron is at a red heat, has a tendency to produce a casting that is either cracked or out of shape.

CHICAGO, Ill. WM. HULTGRAN.

The New Buchanan Locomotive.

Mr. Buchanan, Superintendent of Motive Power and Machinery of the New York Central Railroad, has designed a new locomotive for fast local and suburban traffic. The engine has cylinders 17x20, and wheel centers 57 inches diameter. As Mr. Buchanan is working to make the parts of machinery interchangeable as far as possible, he has arranged that all parts of this engine shall conform to his standard A engine sizes where possible. The eccentrics, their straps, the links, rocker-shafts, cylinder heads and covers, and all such details will be interchangeable with those of any other engine having the cylinders 17 inches diameter. Steel castings are used for every part of the engine where that material is suitable, the practice of using steel castings having proved very economical to this company. Except for the modifications entailed by the short stroke, the engine is of the ordinary eight-wheel type.

Each master mechanic on the road will be given one of these locomotives to make.

Some of the lodges of the Locomotive Firemen's Brotherhood in Pennsylvania have been engaged in a vigorous competition, to see which would outstrip the others in promoting the harmony and prosperity of their several lodges. About Christmas time the members of VanBergen Lodge, No. 62, Carbondale, found it necessary to widen their friendly circle, so they invited the members of Acme Lodge, Scranton, with their wives and other lady friends to a banquet. Superintendent Manville, of the Delaware & Hudson Canal Railroad, warmed the hearts of the firemen and their friends by giving all the banqueters transportation free.

John Fink's Methods Not Appreciated in Canada.

We published last week an extract from a Montreal paper, saying that a capias for the arrest of John Fink was taken out in that city by Mr. John Turnbull. We have since received the following letter from Mr. Turnbull, which throws more light upon Fink's operations:

MONTREAL, Dec. 31, 1884.

Editor American Machinist:

I have just seen the article "John Fink on the Road" in your issue of the 27th inst., and regret to say that he has succeeded in swindling the Cornwall Manufacturing Company.

His operations were carried out in the following manner:

From Jersey City he wrote under the fictitious name of J. C. Ward to the company's office in Cornwall, inquiring where and at what time he could see the President in Montreal.

He was referred to me, and I was foolish enough to allow myself to be imposed upon by his statements and numerous certificates from manufacturers and others in the United States.

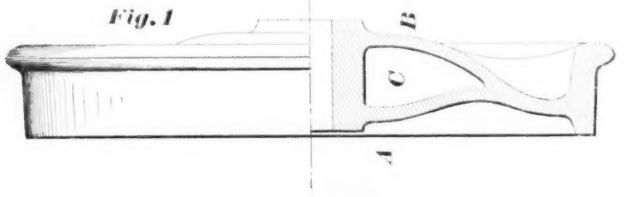
I subsequently learned that the patent and all extensions were bought in 1879 by our company's superintendent, and Fink knowing this did not venture to visit the mill a second time, but adopted the course above stated to ascertain my address without divulging his real name, which would have been fatal to his purpose.

The company, being proprietors of the right to use the patent from the date of the first purchase, instituted a criminal charge against him, and a warrant was taken out for his arrest, but he has not been found, and doubtless is again in the United States.

JOHN TURNBULL,
Managing Director.

An Association of Stationary Engineers was installed at Paterson, N. J., Dec. 30, 1884, by J. H. Cronthers, State Deputy. Peter Earle, 20 Dale Avenue, was elected president. The Association starts with 17 members. It meets at rooms 15 and 16, 1st National Bank building.

Fig. 1



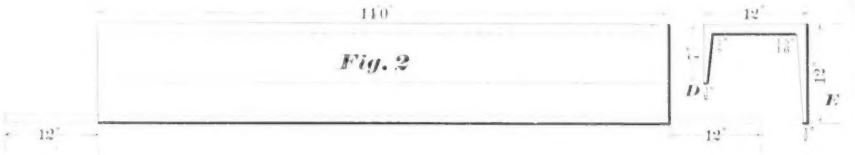
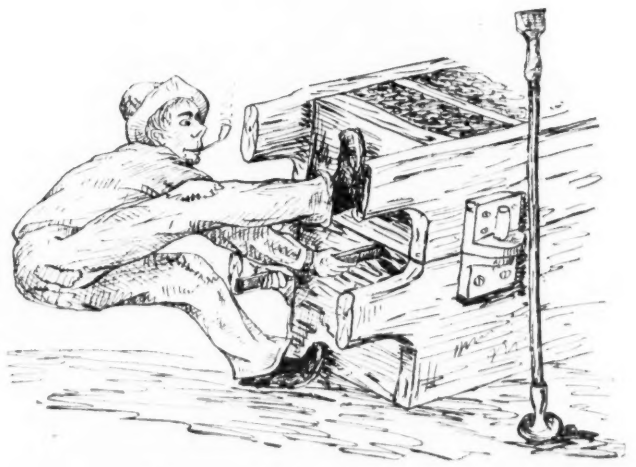


Fig. 2

Fig. 3



PULLING A RIB OUT OF THE MOULD.

A Locomotive Loses Its Dome.

A locomotive belonging to the Delaware, Lackawanna and Western Railroad blew off its dome while standing on a side track at Scranton. The engine had a Wootten boiler, and the dome was on the middle of the cylindrical part of the boiler. The boiler sheet was cut out clean for the dome opening without any flanging, and the dome was secured by its flange with two rows of rivets. The rupture occurred clean round the inside row of rivets, so the whole dome went away without fracture to any other part of the boiler. The force of the suddenly liberated volume of steam tore the cab of the engine to pieces, but fortunately no person was on the engine, and no personal injury resulted from the accident.

We understand that there is reason to believe that the safety valve had got frozen up which distorted it so that it did not work freely. Before the accident the fireman put some coal on the fire, and the steam being low, went away and left the blower on. If this report is correct and the safety valve was out of order there is no difficulty in understanding how the dome came to blow away.

Mr. Dawson, General Master Mechanic of the road is going to strengthen the domes of this class of engine by putting a strengthening ring round the dome opening, whose inner edge will project far enough inside the dome to admit sling stays being fastened that will brace the sides of the dome.

International Inventors' Exhibition.

Mr. Edwards, the British Consul at New York, has made energetic efforts to interest American manufacturers and inventors in the International Inventors' Exhibition, to be held in London this year, but there does not appear to have been much desire manifested to secure space for exhibits. American inventors have produced such a multitude of appliances that have become recognized necessities, that they ought to occupy a prominent place in an inventors' exhibition, and they no doubt would have done so in this case had the New Orleans Exhibition not acted as a counter attraction. Owing to the limited number of applications for space received before the end of last year, Mr. Edwards has got the time for making applications extended to January 31st.

Inventors, owners of patents, and manufacturers of patented articles, for which a foreign market is sought, are so obviously and directly interested in bringing their devices or their wares to the notice of the European public, that it seems scarcely possible they can have been properly advised of the scope and importance of this exhibition. Its aim is to present a view of the progress which has been made in mechanical inventions since 1862. Within this period—almost a quarter of a century—American inventors have made at least as great progress as those of any other country. That the Yankee nation should not be worthily represented at such an exhibition would be both unfortunate and discreditable.

The employes of J. S. Graham & Co., Rochester, N. Y., recently presented J. S. Graham and John Kane, the members of the firm, each with an elegant portrait of himself enclosed in a fine gold frame. On Christmas this firm presented each married employe with a turkey, and each single man with a year's subscription to the AMERICAN MACHINIST.

The best of feeling exists between employers and employes in that shop, and there is no impediment to their continuing to turn out first-class wood-working machinery.

Paragraphs are going the rounds saying that the great Stevens locomotive, the El Gobernado, weighs considerably over one hundred tons. This is a mistake. The engine is only a little over 70 tons' weight, yet she is the heaviest locomotive ever built.

Condition and Prospects of the Machinery Business.

LETTERS FROM LEADING MANUFACTURERS TO THE AMERICAN MACHINIST.

The Nicholson File Company, Providence, R. I., write us:

Our business for the year 1884 has been fully equal, in volume, to that of 1883, but in sympathy with most lines of goods, prices for the past six months have been, and still rule, very low—in fact, lower than ever known before in the history of the trade in this country.

Our line of the new brand of the finer or Swiss pattern goods, known as X. F. files, has been increased in variety, so as to include nearly every known kind and cut of files which are needed to completely meet the wants of the clock and watch manufacturers, silversmiths, and fine tool makers of this or any other country; and our facilities for their production have been correspondingly enlarged.

In fact, we do not know of a class of files that we cannot produce equal to any extant, and we invite the most rigid inspection and test of our goods, that we may improve their quality still further if in any respect they may be found lacking or faulty.

We have received the most flattering testimonials from some of the finest mechanics in the country as to their finish and quality.

Steel has not declined to any considerable extent during the year; labor slightly, but not to correspond with the decline in the manufactured goods.

The prospect with us is good as to volume of business during the coming year. As to prices, stocks are light in consumers' and dealers' hands. All are buying in "pick up" lots of the "all out, ship at once" style, and a very little old-fashioned stock ordering would exhaust our supply and stiffen prices. We see no possibility of prices going lower, and the great study now is to see and obtain a profit on what we do.

The Gardner Governor Company, Quincy, Ill., write us:

Our gross sales for 1884 will be about 15 per cent. less than for 1883, with which we are satisfied, considering the depressed condition of the engine-building industry all over the country.

We look for a decided improvement in business when spring opens, judging from the numerous inquiries we are getting from all sections.

The outlook is certainly not a gloomy one, and we are among those that believe the improvement will come when public confidence is restored, and this is already manifest.

We have made some few necessary additions to our tools during the year, but not for the purpose of increasing our capacity, which we think will be ample to supply the demand for years to come.

We have lately put a new governor on the market, as illustrated in a recent issue of the AMERICAN MACHINIST, which we are pleased to say has met with decided favor, and we are now fully prepared with a full line of tools and patterns to furnish both gravity and spring governors for all kinds of engines.

Poole & Hunt (Founders and Machinists), Baltimore, Maryland, write us:

Business has not been as brisk during this year as we desired. Competition has been sharp, and prices too low, but we have no complaint to make. We have added a number of new tools, and our facilities are better than ever before for producing promptly articles in our line of manufacture, of best quality of materials and workmanship. We do not know what is going to happen, but have no doubt that all will find something to do during the year 1885.

The Willets Manufacturing Company (Jewelers' and Silversmiths' Machinery and Tack Machines), Providence, R. I, write us:

Our business for the past year has been very satisfactory. We have done about 25 per cent. more business this year than last. We have been obliged to add several heavy tools to our plant to fill orders.

Our venture on "tack machines," that we started a year ago, has been a success. The prospect is, that we shall double our sales in that line during 1885.

Jewelers' tools have been decidedly dull for the past year, with small prospect of improvement at present.

Special machinery is some better. We have perfected, and are now at work making machinery to manufacture twist drills by a new and improved method.

Our patternmakers are at work on patterns for a new machine tool, that we expect to bring out the coming year.

Wages in our shop have not been reduced. We are running a full complement of men ten hours a day, and there is a fair outlook that we shall so continue.

Notwithstanding the general depression in the machine trade, we have several months' orders ahead, and our prospects for the year 1885 are very encouraging.

The Ball Engine Company, Erie, Pa., write us:

Our business for 1884 has, on the whole, been quite satisfactory, and a very decided increase on last year's business.

We have run full time throughout the year, with the exception of a few weeks.

We have introduced our engines pretty generally throughout the country, and hope for a good trade during 1885, notwithstanding the general depression in business.

The advertisement placed in the AMERICAN MACHINIST has brought us quantities of inquiries and not a little business. We look for business in all lines to improve before long.

The George Place Machinery Company (Railway and Machine Shop Equipment), 121 Chambers Street, New York, write us:

Business for the year 1884 has been very unsatisfactory. Great depression, and a disposition on the part of buyers to get machinery very low, has been our experience. What will be the condition in the year to come we do not care to venture even a prediction. We hope for better times, but may be disappointed.

The White Machine Company (Presses and Clock, Button, Match, Tack and Wire Nail Machinery), Waterbury, Conn., write us:

We have had a fair amount of business during the year 1884. Our work has been chiefly match, tack, and wire nail machinery, and we have also commenced to manufacture tacks as well as machines. We do not consider the outlook for '85 very flattering, but should it be as good as 1884 we shall have no cause to complain.

The Hendey Machine Company (Machine Tools and Wood-Turning Lathes), Torrington, Conn., write us:

Our business for the year past has been lighter than for 1883, but for the past six weeks there has been quite an improvement, which we hope and believe may continue. We have reduced our prices somewhat, and with some important improvements and additions to our tools, we have reason to expect a better trade.

The Brown & Sharpe Manufacturing Company (Machinery and Tools), Providence, R. I., write us:

During this year we have added 128 feet to our main building, which is now nearly 300 feet long. This addition we are gradually filling up, with a view to increase our production as soon as the demand will warrant. We have run ten hours per day from January 1 to September 22, from latter date to December 1 nine hours, and since December 1 eight hours per day, employing 450 hands.

Although the demand for our products has been smaller than usual for the past three months, we feel hopeful of some improvement early in the year.

Thomas H. Dallett & Company (Machinists' Tools), Philadelphia, Pa., write us:

Business has not been as good with us during the past year as it was in either 1882 or 1883, yet we have had a fair trade in our specialties.

We have lately added several new sizes to our list of machinists' tools, and have also enlarged our plant by a number of special machines, greatly increasing our facilities for manufacturing. These improvements directly affect our portable drills, which are gaining in favor every year.

Our prospects for the ensuing year are fair, and we expect a considerable increase in business.

The Abendroth & Root Manufacturing Company (Wrought Iron Sectional Safety Boilers and Spiral Riveted Pipe), 28 Cliff Street, New York, write us:

We have to report a very satisfactory business for the year 1884. The increase of sales has caused us to add largely to our productive capacity in tools and buildings. During a great portion of the year we were obliged to work overtime in order to keep pace with promised deliveries. Prices paid for stock have ruled lower, but wages are the same as in 1883.

We think the prospect for the coming year very fair, and anticipate a larger and more remunerative business.

S. Ashton Hand (Machinists' Tools), Toughkenamon, Pa., writes us:

Business has been very dull with us for the past year. I am hard at work getting up some novelties, which I think will take when business revives.

Bradley & Company (Harvesters, Mowers, Rakes, and Cushioned Hammers), Syracuse, N. Y., write us:

Our business has three divisions—trip-hammers, agricultural implements, and vehicles. Owing to the depression in the iron and steel business our hammer sales for 1884 show a falling off from 1883. Our sales in other lines have been well up to the average, but the business as a rule has not been what might exactly be called satisfactory. The present outlook is fair only, although it is early yet to predict as to the agricultural business. We are looking for a quiet year generally.

The Hancock Inspirator Company (Inspirators and General Jet Apparatus), Boston, Mass., write us:

Our business for the year 1884 has been quite satisfactory. We have sold over 17,000 inspirators, in spite of the general depression, and now have 70,000 inspirators in use and numbered our seventy-fifth thousand some weeks ago. We have occupied our new factory, and find it to be all we had hoped and expected, and are prepared to do any amount of business. We expect to number our one hundred thousandth inspirator before the end of 1885, and to bring our total sales very near that point.

The Allen Portable Pneumatic Riveting Machine Company, 304 Broadway, New York, write us:

The year 1884, although not equal to 1883, was altogether satisfactory, particularly as regards the machines for bridge builders, and, from all appearance, we expect an equally good business in 1885, and hope, as general business improves, to do better.

Amongst the additions we made in our class of machines, we have to state that we make the riveters for bridge work now with 55 inches reach or length of arm, of which style we have two now in operation in Pittsburgh and inquiries for two more.

We make a heavier riveter taking in plate girders with 20-inch plate on edge, reaching 36 inches, and operated by 12-inch cylinder. One of these riveters is in operation at Passaic Rolling Mill, Paterson, N. J.

In riveters for boiler work we made no particular alteration in our regular portable machines, which, for light work, seem to give general satisfaction, having now about one hundred of them in operation; but we have lately put up a stationary riveter reaching 72 inches, and capable of operating on 1¼ inch rivets, and provided with a compression arrangement to compress the plates before and during the operation of riveting, lately patented by our Mr. Allen. This machine is in operation by McWilliams & Brown, Jersey City, N. J., and we received this week an order for a similar machine from John J. Herley, Fishkill-on-Hudson, besides several further inquiries for this kind of machine from parties having seen its operation in Jersey City.

Cooke & Company (Machinery and Supplies), 22 Cortlandt Street, New York, write us:

We are glad that we can report ourselves satisfied with the past year's business. The volume of our trade has been larger than in 1883, and, although prices have been exceedingly close, when we consider the unusual depression in every branch of business, we feel that we have been quite fortunate.

No one can accurately forecast the future. On the one hand, there is undoubtedly an uncertainty in the minds of a great many manufacturers and investors as to the effect which the policy of the incoming administration will have on industrial matters; this uncertainty may retard a business revival. On the other hand, merchants have been buying for a long time from hand to mouth, and consequently stocks are low. It is generally believed that prices have at last touched bottom, and these two facts may lead to the placing of large stock orders. If the ball is once set rolling in this way, we will soon reach an era of higher prices and heavier orders.

While no man can tell to a certainty which way "the cat will jump," it seems to us that the prudent business man ought to prepare himself to take advantage of "the good times coming"—soon, if not sooner.

The New Haven (Conn.) Manufacturing Company (Machinists' Tools) write us:

For the first six months of 1884 our business was very satisfactory, and we had no cause for complaint; but since the month of July, sales and prices of our goods have dropped continuously, and there is no denying that these are dull times. What 1885 has in store for us, of course, cannot be told now, but we really have great hopes of an early and continued improvement in business, based upon the present greatly reduced production and consumption, as well as the exceptionally low prices ruling.

While prices of materials are generally very low, we have made scarcely any reduction in the price of skilled labor, and the constant addition to our tools in quality and weight keeps the cost of manufacture fully as much as heretofore. In these days of constant and unceasing change and improvement in machinery, we find it necessary to keep the production as little as possible in excess of the demand, to prevent accumulating a stock that may soon be without all the latest improvements; hence, in such times as these, we prefer to restrict production to something near our sales, and for that reason are running at reduced time in these short days. We send kindly greetings to you and to all our manufacturing brethren, customers and competitors alike, and trust that when, at the end of another year, you ask us for these particulars, we may all be able to write you of a prosperous and busy year.

The Russell Tool Company, Boston, Mass., write us:

We are making a drill chuck which holds the drill by a new principle, and it gives universal satisfaction. The demand is increasing, and from the outlook now we expect to do more than double the business in 1885 than in the year just closed.

The Union Twist Drill Company (Farmer Universal Drills), Boston, Mass., write us:

The demand for this drill as it is becoming known is increasing fast, and we hope in 1885 to be able to supply the trade better than during the year just closed, as the demand is taxing the resources of the company to such an extent that we are obliged to constantly add new machinery.

Dwight Slate (Machinery), Hartford, Conn., writes us:

My business has not been so good in 1884 as in 1883. I am running full time with more than two-thirds my usual force, and have enough special work to last till next summer. I am making wood screw machinery, arc lamps, and electrical work. Prices are lower, but labor and material are cheaper. I am selling some of my regular tools, but not many, except lathe cutting-off tools, which are selling faster than ever. I have made no additions to my plant, but have changed my shop methods and have no more work done by contract. I consider the contract system a poor one for small shops, except, perhaps, during a "boom," and then the quality of the workmanship is likely to suffer. I do some export business, and hope to increase my trade in this line during 1885. My business is not extensive enough to enable me to give a decided opinion on prospects for 1885, but as far as I am concerned the outlook is fair.

The Blevney Manufacturing Company (Friction Pulleys, Clutches, etc.), Newark, N. J., write us:

We take pleasure in informing you that we have reasons for being satisfied with our present business. Although only a little over four months in the market with our specialties, their sales are such that we were unable to manufacture them as fast as ordered, with the facilities arranged for probable demand.

We had to increase our facilities, and have now a factory, including foundry and machine shop, of 340x125 feet, where, we expect, with the special tools and appliances built and being built, to be equal to the demand that may be made upon us during the coming year.

We are pleased to say that we have yet to find the first dissatisfied customer, and hope to be able to say the same at the end of the year 1885.

In addition to the universal satisfaction our goods give, we give a good deal of credit for our satisfactory business to our liberal advertising, and can state for your special benefit that, aside from the inquiries and orders received through your publication in the United States, those from Italy, England and Canada more than balance the cost of the advertisement.

We have a full line of samples at New Orleans, and expect a full share of the business that may be boomed through the exposition.

The Egan Company (Wood Working Machinery), Cincinnati, O., write us:

Our business during the past year has been, on the whole, satisfactory, the amount of goods sold having been a good deal in excess of the year 1883, but prices having declined considerably during the past four months, the money value of our sales has been almost the same as during the previous year. Our shipments have been in small lots, showing close work in buyers. Our wood-working machinery for pattern shops has been notably satisfactory, the Eastern pattern makers showing a decided advance in getting special tools to facilitate the work of their wood shops.

Materials and labor have also declined to some extent, but labor in our line is higher in proportion than the prices of our goods would justly warrant, as our men have to be first-class mechanics. We have only been able to hold our own by making constant improvements in our machinery, illustrations of which we have tried to furnish you with during the year from time to time. Even now we have under way and near completion, several new and improved wood cutting machines. Among the latest of our machines is a new back knife gauge lathe, which embodies several points of great practical value; also a rapid feed special flooring machine, which is pronounced by experts as superior to any other made. We are now working on a new illustrated catalogue.

The Cleveland Twist Drill Company, Cleveland, O., write us:

Business for 1884 with us has been fully up to 1883 in volume, but a slight reduction in prices, owing to sharper competition, has lowered the net amount of receipts slightly. We have fully made up for this, however, by the introduction of improved machinery and methods. We have added several improved machines during the year 1884, and are now closed to make some further improvements and for better arranging our plant. We anticipate a better volume of trade for 1885, but think prices will rule lower.

Kearney & Foot Company (Files and Rasps), 101 Chambers Street, New York, write us:

While we have largely increased our works during the years of '83 and '84, consequently largely increasing our production, we now find ourselves in the last month of 1884 well supplied with orders and a fair demand for our goods. While the cost of material is much less, and the price of labor has been slightly reduced with us since December 1st., the saving in cost of production has been more than offset by the very large discount it has been necessary to give on our goods in order to meet the market price and the necessities of the times. We now see slight symptoms of improvement through reports from our customers in most sections of the country, and while we do not look for any decided increase in business after January 1st, we think that there will be a gradual improvement, which may develop into a fair trade by the last of February or the first of March.

We probably voice the sentiments of other manufacturers when we state that we are getting greatly reduced profits on our files, and any improvement in business will undoubtedly advance prices.

Geo. B. Grant (Gear Wheels and Calculating Machines), Boston, Mass., writes us:

Business for the past year has been good on the whole, but dull for the past two months. The sum total for the year is a decided improvement on last year.

Prospects for 1885 are uncertain, and machinists in Boston expect dull business for some months to come. New England manufacturers are holding back until the tariff policy is settled, and the machine business here is directly dependent on the larger mills and manufacturing corporations.

My facilities for making and cutting gears have greatly increased, and I believe I am now second to but one concern in the country in my specialty.

The Yale & Towne Manufacturing Company (Engineers and Proprietors of Yale Lock Manufacturing Company, the Emery Scale Company, and Weston Crane Company), Stamford, Conn., write us:

It is difficult for us to make any general report for 1884 which will embrace all of our departments. The only general statement which can be made concerning them is, that buyers have been much more cautious than usual, and more disposed to insist on lower prices.

The volume of our business has been quite satisfactory, and unexpectedly so in our crane department, in view of the generally depressed condition of the iron industries. It appears quite evident that manufacturers are fast realizing the fact that their facilities for handling goods have been deficient, and that even in dull times they cannot afford to lose the economy which proper facilities for handling will produce. In this line of our products, however, more than any other, customers have insisted on extremely low prices. The decrease in cost of material, and some reduction in wages, have enabled us to meet these demands, we believe, in a satisfactory way.

We have during the year very much extended our line of cranes and hoisting machinery, both in variety of types of cranes and also in range of sizes. We have just completed for the Cleveland City Forge and Iron Company, a 30-ton hand jib crane, with a mast of about 23 feet, and a jib of 20 feet., which, we think, for strength and efficiency, is an advance on any previous machine of this type. We have also under way for the Midvale Steel Company two 15-ton power jib cranes, which possess some radical improvements. Our earlier types of cranes, such as the power traveling cranes, have also been improved in general design and in details to render them simpler, more durable and more easily accessible.

In our line of fine locks and hardware the volume of our business and prices have remained about as usual. With regard to the outlook for the coming year, we feel quite hopeful, and believe that the indications are for a good spring trade.

The Hewes & Phillips Iron Works (Machine Tools and Steam Engines), Newark, N. J, write us:

While it has never been our practice to make public the inner workings and history of our business, we do not hesitate to say the past year has been rather an unsatisfactory one. In volume we have no reason to complain, but competition has been so keen, and prices so low, that our profits have been insignificant. In reference to the prospects for '85, would say that we are unable to make an intelligent prophecy. In our opinion, however, it is to be an era of low prices and moderate demand.

The Cincinnati Screw and Tap Company (Machine Screws, Taps, Dies and Milling Machines), Cincinnati, O., write us:

We have made quite extensive additions to our tools during the past year, principally for the increased manufacture of our new universal milling machine and gear cutter. The merits of these useful and economical tools are now acknowledged by all mechanics.

The invention of a universal head (patent pending) has added another valuable attachment to the machine. It turns upon the table and makes a complete revolution on its horizontal axis, upon which marking and indexing are performed and bevel gears cut. Same can be used on any milling machine in the market.

The H. W. Johns Manufacturing Company (Asbestos Materials), 87 Maiden Lane, New York, write us:

Our business is, as usual, increasing, and to meet the demand of the Western trade we have opened a branch at Chicago.

Prices have ranged lower than in 1883. We have made additions to factory and machinery; prices for labor have not as yet been reduced.

Stearns Manufacturing Company (Saw-Mill Machinery, Engines and Boilers), Erie, Pa., write us:

Up to August, 1884, our business was not more than 20 per cent. behind 1883, but since then it has dropped to about 40 per cent of our usual business. Our force and the working hours have been correspondingly decreased. We have made one reduction of about 10 per cent. in wages. During the past two weeks, however, we have been quite busy answering inquiries, and we feel that there are many who contemplate investing, and will do so as soon as it is felt that bottom has been reached.

Dull times have given us an opportunity to improve both our plant and our products, and we are in a first-class shape to tackle a boom.

The Pratt & Whitney Company (Machinists' Tools), Hartford, Conn., write us:

Our shipments during 1884 have amounted to only two-thirds of those for 1883. Our orders have averaged the same for the first and last halves of the year. Although each half fell below the first half of 1883 seventeen per cent. they exceed the second half of that year by about ten per cent.

The number of men employed at the beginning of the year was something over 500; it is about 400 at present. We are running ten hours per day; think it probable that we will have to reduce the working time very soon.

Our stock of machinery finished for market has increased very little during the year. We have given considerable attention to the manufacture of reamers, hardened steel mandrels and corundum wheels, and have encouraging reports from those who have used them.

Jackson & Tyler (Machinery and Supplies), Baltimore, Md., write us:

For the first six months of 1884 our business was larger than we expected, but has fallen off the latter part of the year. In our machine shop department, while not working a large force, we are and have been able to keep the greater part of our hands at work. We have now some special contract work, and manufacture emery grinders, wood lathes, gear cutting attachments, bolt cutters, arbors, &c. We have sent an exhibit of these machines to New Orleans World's Exhibition.

In our machine tool and supply department, business is quiet now. We are selling some engines of the horizontal pattern, and our business in this line has very much increased the last twelve months. We think prospects for 1885 are good—at least we look for much improvement over the last few months We know of quite a number of new enterprises that will start up towards spring.

Watts, Campbell & Company (Steam Engines), Newark, N. J., write us:

We have done a larger business during the past year than any previous one. Have added to our plant and put in special machinery to enable us to do our work better and cheaper.

We work entirely to order, and at the present time have orders on hand that will keep us busy for several months. Among the orders we have at present are the following: A pair of 28″x54″ condensing engines for the Glen Cove Manufacturing Company, Glen Cove, N. Y.; a 20″x48″ and 34′x48″ tandem compound for James G. Kitchen & Company, Philadelphia, Pa.; two 30″x60″ for New York Dye Wood Extract and Chemical Company, Brooklyn, N. Y.; two 30″x60″ for North Hudson County Cable R.R. Co., Hoboken, N. J.; one 18″x36″ for David Mayer's Brewery, 168th st., New York; one 20″x48″ for William Arnott, Philadelphia, Pa.; one 20″x42″ for Walton Machine Co., Paterson, N. J.; one 20″x42″ for Sutherland & Edwards, Paterson, N J.; one 16″x42″ McNab & Harlin Manufacturing Company, Paterson, N J.; one 20′x42″ for American Bank Note Company, New York City; one 14″x32″ for New York *World*, New York City; one 16″x30″ for James Everard's Brewery, 133rd street, New York City; one 16″x30″ for F. J. Kaldenberg's Brewery, 33rd street, New York City; one 12′x28″ for Washington Building No. 1 Broadway, New York City; one 14″x32″ for Keuffer & Essex, Hoboken, N. J.; one 16″x38″ for J. J. Arch, South Norwalk, Conn.; one 20′x48″ and 34″x48″ compound, for Highland Worsted Mills, Camden, N. J; one 26′x42″ for McCallum, Creaco & Sloane, Wayne Junction, Pa.

C. Wing (Patterns), Greenfield, Mass., writes us:

My business during the past year has not been so good as in 1883, but still satisfactorily prosperous. The past summer I have had a new shop built 50x30 feet, two stories high, and basement, which gives ample room and excellent light for our business, which is designing new machines, pattern and model making.

I am also getting up and perfecting special tools for the manufacture of a hand lathe of new design which I am intending to manufacture.

I consider the outlook for 1885 at least encouraging.

Melvin Stephens (Stephens' Vises and Planer Chucks), 41 Dey street, New York, writes us:

My business for the past year compares favorably with that of the preceding year. The closing of so many mills and mechanical industries in which my tools are used, and from which sources I have looked for a constantly increasing demand, has of course correspondingly contracted such demand, while on the other hand it has been off-set by orders from other sources, although principally by a largely increased export. The outlook for the coming year is decidedly promising.

James F. Hotchkiss (Mechanical Boiler Cleaner), 86 John Street, New York, writes us:

The past year has shown a steady increase in the demand and sale of my boiler cleaners; one pleasing feature being the renewed orders of parties who have used the cleaner and acknowledged the necessity of supplying their new boilers by sending in their orders. The call from the South in iron-working establishments using boilers of great length (30 to 50 feet), has necessitated my getting out a special size, adapted to boilers of large diameter or great length, as well as for boilers using extremely bad water. During the past year the cleaner has been introduced by me in Great Britain with success, and endorsed by such firms as Peek, Frean & Company, London; Brown, Lennox & Company, and others; while the orders for South America, Cuba, and Australia have been liberal. The outlook for 1885 is good.

Forbes & Curtis (Die Stocks, Ratchets, etc.), Bridgeport, Conn., write us:

We are working about one-third the number of hands that this time last year found us employing, but at that time we had the men mostly on tools required to produce our several articles; to-day all our men are on work which gives money returns, and our output is about as much as it ever was. We have had better orders in the last three or four weeks than we received in the previous four months.

We have added to our plant in standard tools two lathes and a die sinker, and of course many special tools

We make no change in wages, and do not find much change in cost of material.

We look for a good trade in 1885 in our new products, but believe that low prices will be the rule.

D. Saunders' Sons (Gas and Steam Fitters' Tools), Yonkers, N. Y., write us:

Our business for 1884 has been fair, but not as large as 1883; employing about the same number of hands as we had last year at this time, run full time throughout the year. At present prospects are encouraging for an increase in trade. Have added nothing to our plant the past year.

J. S. Graham & Company (Wood Working Machinery), Rochester, N. Y., write us:

We find upon examination of our sales-book that, notwithstanding the general depression of business for the past year, we have done 18 per cent. more business than in the year of 1883. Of course this would be considerably increased had the prices continued the same. We ascribe our large amount of business done to the fact that the market appreciates high grade machinery specially adapted to the rapid production of first class work in the most economical manner. We now have enough work to keep us busy at full time and full force until February 15th with fair prospects for more.

Having recently moved into our new works, of which we will give you a description soon, we are provided with at least triple the capacity we formerly had in the old place.

Clem & Morse (Elevators), Philadelphia, Pa., write us:

Considering the general depression that has prevailed during the past year, our business has been very satisfactory to us. Competition has been strong and margins of profit very close, but we have maintained a standard of excellence that has brought us trade when our competitors could not secure it.

We are now working 79 hands, 9 hours per day. Inquiries come in slower at present, and we do not look for much improvement for several months yet, but we have faith enough to believe that better times will come in the spring, and are therefore making preparations that will enable us to largely increase our output We have recently bought property with a frontage of 50 feet on Frankford avenue, 353 feet 5 inches on Wildey street, and 60 feet on Shackamaxon street. A four story building with basement is now standing on Frankford avenue, and extending along Wildey street 165 feet 6 inches. Adjoining this are two story buildings with boiler house and stables. We are now having erected a one-story building, for our wood working department, with a frontage of 60 feet on Shackamaxon street and 100 feet on Wildey street, thus completing the chain of buildings through the whole block

We have made quite a specialty of supplying our patent automatic hatch doors, pneumatic safety clutch, Albro-Hindley screw elevator, etc., to the trade, and hope to largely increase this branch of our business when we get into our new quarters, as we shall add improved special machinery that will enable us to reduce cost so we can supply elevators to smaller establishments at lower figures than they can build them for themselves. We shall retain our Philadelphia office at 411 Cherry street, and New York office at 108 Liberty street as heretofore.

L. Katzenstein & Co. (Metallic Packings), 169 Christopher Street, New York, write us:

Our business in 1884 has been satisfactory—in fact, larger than in 1883. Orders have constantly been coming in from the United States and European countries for our metallic packing, and also our flexible tubular metallic packing. This latter packing, although not long in the market, has won its way pretty well so far. Will especially mention among some of our large foreign orders, those which we received for the large English steamers lately built for the ocean trade, which all have both our metallic packings in their engines.

We have not for a single day been forced to decrease the number of hands, but, on the contrary, have often had to work overtime. We have orders to fill for some time to come, and consider the outlook for 1885 very fair.

O. E. Hausburg (Buerk's Watchman's Clock), 71 Nassau Street, New York, writes us:

During the past year I have improved my clock by adding the safety lock attachment, patented, which makes it impossible to open the clock without recording the fact on the dial. This, I think, is a very important advantage, as, no matter what the mechanical skill of the person handling the clock may be, he cannot open it without detection. I have also made improvements in the finish of my goods, such as in plating the keys, machine polishing cases, etc. Being a practical watchmaker, I examine and overhaul my goods personally, and have yet to record the first case where my clock has not proved satisfactory. The past year's business has not been what it should, but the outlook for next year is good.

James Hunter & Son (Founders and Machinists), North Adams, Mass., write us:

There is nothing new, except that business with us is rather quiet.

Charles E. Lipe (Milling Machines and Special Machinery), Syracuse, N. Y., writes us:

My business for 1884 has done fairly well, although at present it is very much depressed. Prices are low and prospects uncertain, but feel confident of a revival in the near future.

The Rollstone Machine Company (Wood-Working Machinery), Fitchburg, Mass., write us:

Our business is not as good as a year ago. We are feeling the depression very much, running a reduced force and only eight hours a day. Prospects for trade for the year 1885 are not as encouraging as we hoped, but our correspondence indicates a better feeling, and our calls for machinery are a little more earnest, but do not consider the outlook for the coming year sufficiently encouraging to warrant any increase in stock.

The Valley Machine Company (Steam and Power Pumps), Easthampton, Mass., write us:

Our steam pump business for 1884 has not been as profitable as in years past, as competition has greatly increased and prices are much reduced. We look for an improved state of things next year, and are better prepared to do work than ever before, having added another story to one of our buildings and increased its length, and have also put in some special tools and otherwise improved our plant. We have made no reduction in price of labor as yet, but may have to do so, after economizing in every other way we can first.

George C. Howard (Machinery), Philadelphia, Pa., writes us:

We are employing the same number of hands as last year at this time. There was a gradual increase of business of fifty per cent. until July. In August our number of workmen was reduced to the minimum, or family, as we call it. Occasionally we are compelled to increase our force and run night and day Wages are lower than in 1883. Not much change in the cost of raw material. We have the tools for double the number of workmen now at work, and shall put in some new tools next year. Our product has been cotton, worsted and wool goods finishing and measuring machinery, hand power and hydraulic elevators, punching, perforating and cutting machines. Street-sweeping machines are now active. We do not anticipate any larger business than last year's, although prepared for more.

The Curtis Regulator Company (Steam Heating Specialties), Boston, Mass., write us:

We have found business quite dull during the year 1884, not so much a falling off in our sales as a failure to increase as in years past. We are not at present receiving much encouragement for the future, though in some lines the demand is increasing.

We are bringing out a new return steam trap and a new damper regulator for boilers, which seem to meet popular favor, and we hope these will bring up our increase to the usual amount before our financial year ends—May 1st, 1885.

The Lidgerwood Manufacturing Company (Hoisting Engines, Stationary Engines and Boilers), 96 Liberty Street, New York, write us:

Our business for 1884 has been satisfactory, but we look for a decided improvement in the ensuing year.

In the early part of 1884 we completed our new boiler shop, and have got it in complete working order. Our shop is fifty feet in width and 120 feet long on one street and 102 on the other. We are fully equipped with a 50 foot-power traveling crane and several other traveling cranes, and have a full complement of the finest tools to be procured. Our rolls are a special feature, being of the vertical type, 10 feet in height and made from our own patterns, and are a decided improvement over anything in the market. We erected this boiler shop for the special purpose of building the finest boilers in the country, and we beg to say that at the first place where they were exhibited—namely, at the Massachusetts Charitable Mechanic Association at Boston—we were awarded the gold medal.

The Syracuse Twist Drill Company (Sweet's Measuring Machine), Syracuse, N. Y., write us:

Our manufactory was entirely destroyed by fire on the 21 of May, but we have rebuilt it in a more substantial manner, and with enlarged and improved facilities for our work.

Notwithstanding the interruption, our output has not been very much less than for 1883. For the past two or three months our trade has been somewhat reduced, but we feel encouraged to expect a good amount of business for the coming year.

Our specialty, Professor Sweet's patent measuring machine, is as yet quite new, and the present does not seem to be a favorable time for its rapid introduction; but all who have purchased them give us assurances of satisfaction, and with a revival of business we are confident of a good business in them.

The Cohoes Iron Foundry and Machine Company (Elevators and Machinery), Cohoes, N. Y., write us:

Our business for 1884 has suffered from the general shrinkage in volume and prices, in sympathy with the business interests of the country, though in some lines of our manufacture—notably portable forges—the demand has exceeded 1883. We have made no extended improvements in plant or machinery during the year, nor are we proposing to do so in the near future.

The decline in iron and steel has not equaled the decline in selling prices, while in labor we have made no reduction; consequently, profits are at the minimum.

Under these circumstances, we do not take a rose-colored view of next year, and see nothing in the immediate future to warrant it. We believe the remedy for the present sick condition of our commercial interests is foreign demand for our manufactures to take the surplusage, and to that end all of the treaties now before Congress should be ratified, and others negotiated as rapidly as possible.

W. C. Young & Co. (Light Machinists' Tools), Worcester, Mass., write us:

Our business up to about November 1st was all we could ask for, as we worked ten hours a day on orders. At the present time we are running three-quarter time, and working mostly on stock, although we are receiving some orders now, and a large number of inquiries for prices, the expression "We shall not purchase until after the 1st of January" being contained in most of them. During the year we have added to our list of machines manufatured 26″ swing chucking lathe, 14″x16″ hand lathes, 15″ engine lathes, and entirely rebuilt our 10″ screw-cutting foot lathe. We expect to do a fair amount of business in 1885, but do not expect a boom.

The Kensington Engine Works (Engineers and Machinists), Philadelphia, Pa., write us:

We have no reason to complain of the results of business for 1884. Our total sales show an increase of 28 per cent. We have built over a third more engines, averaging larger cylinders. We think the increase in our business is due to the attention we have given to it, coupled with the thorough manner in which we have done all our work. We have been able to keep our usual number of men fully employed, and have not found it necessary to reduce wages. We have materially improved our facilities for doing work, and our men have seconded our efforts and tried to contribute to our success by the manner in which they have worked and the care they have taken to see that each job was done properly. The result has been an increased output per man per hour. A considerable portion of our business during the year has been putting our engine in to replace old engines, we having devised a plan by which we can place our automatic engine on old foundations. In several cases we have torn out the old engine, put in the new, and started the parties up within a week's time. At the present time business is very quiet, with but little inquiry.

Schleicher, Schumm & Company (Otto Gas Engines), Philadelphia, Pa., write us:

Our business during 1884 was up to our expectation, considering the general aspect of business in the country We note an increase in sales of larger sized engines, and sold a fair number of our new combination of engine and pump, also of twin engines, and special ones for electric lighting. We look for a general improvement in 1885.

Skinner & Wood (Steam Engines and Boilers), Erie, Pa., write us:

The decline in business activity which manifested itself in the summer of 1883, has continued throughout the past season and developed into a general business depression which we are inclined to attribute more to overproduction than to politics or tariff meddling. In our own city where ten years ago there were three engine and boiler manufacturing establishments, there are now seven, an increase not warranted, we believe by a healthy and permanent demand. In another week or ten days we can tell accurately what the percentage of decrease over previous business years has been, when we close our books, but roughly we estimate our sales at about 30 per cent less in value than in 1882 (a good year) and our profits correspondingly less.

To sum up, we find all material low, labor still too high. Inquiries are very numerous considering the season and circumstances. Orders are as abundant as usual in December, and profits still such as to pay a reasonable interest on our capital

We take a hopeful view of the future and think in February or March a decided appreciation in the values of material will commence.

Osgood Dredge Company, Albany, N. Y., write us:

We report a very dull year. There are plenty of enquiries for machinery, which do not seem to come to anything. We have just completed a mammoth excavator for the Pacific Guano Company, of Boston, for work in the phosphate beds of South Carolina. During the year 1884 we have built among others a No. 1 excavator which has just completed a seven months' season in the hands of McArthur Bros. of St. Paul. Its average for the whole seven months was 1,200 cubic yards of very hard clay per day. In the deep cuts it ran up to 1,800 and 2,000 yards per day. They inform us that the cost of repairs during the season were merely nominal. We have three or four contracts in view and feel hopeful for the future.

The Betts Machine Company (Machine Tools, Standard Gauges, etc.), Wilmington, Del., write us:

Our business is dull. We have been obliged to lay off some of our hands, and during these dark days we have been closing our works at 5 o'clock in the afternoon.

We do not believe, however, that the country is finished and ready to be fenced in, and acting on this belief have been getting our plant into better shape than it has ever been, so as to be ready for the next good time, when it does come. During the past year we have spent a large amount of money in building a new erecting shop, putting into it the most improved traveling crane of 20 tons, capacity. We have put in new and better tools for improving our product, and are now bett r prepared than we have ever been to accommodate our customers, and will be pleased to show our improvement to any of our friends who may feel an interest in the matter.

Business in our gauge department shows the general depression throughout the country, though we are gratified to report the growing interest manifested in the whole subject of standard gauges and implements of like character.

L. B. Flanders' Machine Works (Special Tools for Railway Repair Shops), Philadelphia, Pa., write us:

We have every reason to be pleased with business done during the past year. While not as pushed as we like to be in our special tool department, we have had a steady regular trade, requiring our full force. Several new tools have been added for our shop use. New specialties have been obtained for facilitating repairs to locomotive engines that are giving most excellent results, and we are about putting on the market three new specialties in this line.

In our general machine business we have been kept very busy indeed. Our boring bars have been in very general use, and we are now boring in place sixteen large pump cylinders for our water department. We have made and put in a large number of new pistons with our spring packing and the best of satisfaction is given by them.

As to the future, we anticipate a fair business in both departments. Inquiries are not so numerous as last year, but we have no reason to suppose that business in 1885 will not equal, or almost so, that of 1884.

The Stow Flexible Shaft Company, Philadelphia, Pa., write us:

Our business, like all others, has dropped off considerably during the year just closed, but we have hopes that it will revive again this year.

We have run the shop the whole year without interruption, and with only a slight reduction in our working force during the past two months.

We have done a good deal of experimenting both for ourselves and others, on new tools and machines, and have perfected some things, which we trust will increase our trade this year. Among these we would mention the Caldwell Variable Speed Chain Hoist. This tool has been long in process and experiment, but at last we have it ready for the market, and believe it will be much liked.

The Norwalk Iron Works Co. (Steam Pumps and Air Compressors), South Norwalk, Conn., write us:

We have had no "boom" the past year. Our usual force has been steadily employed.

We have made some new special machines, among the number an air compressor which produced 3,500 lbs. pressure per square inch, the highest pressure of air we have knowledge of outside of the laboratory.

The Standard Tool Company (Twist Drills), Cleveland, Ohio, write us:

As we only commenced building our machinery two years ago, and have only made twist drills a year, we can make no comparisons with former years. Our success has been beyond our anticipations We have had an average of fifty-four hands on the drills, 10 hours a day, and with a constantly increasing demand, each month showing larger sales than the preceding month. Prices are nearly 50 per cent. lower than a year ago.

[A considerable number of letters stand over to appear in our next issue.]

AMERICAN MACHINIST

PUBLISHED WEEKLY

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EDITORIAL ANNOUNCEMENTS.

☞ *Positively we will neither publish anything in our reading columns for pay or in consideration of advertising patronage. Those who wish to recommend their wares to our readers can do so as fully as they choose in our advertising columns, but our editorial opinions are not for sale. We give no premiums to secure either subscribers or advertisers.*

☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, JANUARY 24, 1885.

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The Machinery Trade As It Is.

We present this week letters from sixty establishments manufacturing machinery, engines, boilers, tools and shop supplies, which have been written in answer to our sixth annual inquiry as to state of business—progress during the past year and prospects for the ensuing year. We have received about half as many more of such letters, which will appear next week. It is almost superfluous to say that the machinery trade is depressed, but these letters indicate that the depression is not as bad as it has been represented, by repeated publication in the daily papers of items about cuts in wages and the wholesale discharges of workmen. The main features presented, however, are fewer workmen employed, fewer hours of labor and reductions in prices of finished products. It should be noted that in many instances where actual selling prices have not been reduced, heavier and better machinery is being furnished at the same prices that prevailed a year or two ago. This gives the purchaser as much benefit as a reduction without improvement in quality—in many cases a greater benefit. The tone of the letters we have received is generally hopeful but not over confident. Advantage has been taken of dull times to improve manufacturing plants, and methods of production. There is a growing disposition among manufacturers in almost every line to improve their power plants, and to this fact, as well as to a large number of new enterprises requiring power, may be attributed the extra activity among engine builders and boiler makers as compared with business in other kinds of machinery. Economy in the use of coal has something to do with it.

We can observe no diminution in the number of new and improved machines and tools brought out during the past year when compared with former years.

The most unfavorable feature we can see is a disposition in some places to make further reductions of wages. As long as this tendency exists the prices of finished products will not be strong. The prospects of reduced cost of production induces buyers to defer purchases in the hope of obtaining what they require at lower prices. When rates of wages appear firm an advance in selling prices may be expected. But the improvement of business depends largely upon what action Congress takes upon economic questions. It has the power to do a great deal of good or a great deal of evil. If the surplus in the U. S. Treasury were put into circulation, and the country assured that no adverse tariff legislation would be undertaken for three years to come, we might look for a rapid and substantial revival of business.

Reduction of Wages on the Philadelphia and Reading Railroad.

The prevailing depression in the transportation business of the country compels railroad managers to apply the pruning knife to expense accounts; but there are widely different methods of reducing operating expenses. The course followed by two leading railroads is characteristic. The management of the Pennsylvania Railroad proceeded to cut off every superfluous member of the different departments, but did not interfere with the pay of those remaining at work, for they concluded that reducing salaries had the tendency to send the most valuable men into other employments, and the road could not be operated cheaply with inferior labor. The leading rival of this company—the Philadelphia and Reading Railroad Company—took an entirely different course. Ever since Franklin B. Gowen fastened his influence on the Reading system the employes have been more or less tyrannically treated. Every few months extraordinary efforts have been necessary to preserve the corporation from foundering under its burden of debt, and the employes' hard-earned wages are habitually used to protract the day of final disaster. The obligations which a corporation or individual ought to be compelled to pay first are the wages of the men doing their work, but the Gowen policy has been to pay workmen last, and to pay them in promises whenever that method of double delay was practicable. The management of the road are now inaugurating the new year by a sweeping reduction in the wages of all employes.

As it may safely be concluded that the Pennsylvania Railroad management were correct in their belief that reduction of wages entailed reduced efficiency of service, it is hard to conceive how the Philadelphia and Reading is going to be operated with safety to the traveling public after the service is made a little worse than it is already. By the record of accidents published monthly in the *Railroad Gazette*, which merely embrace accidents that have got into the newspapers, we find that the Philadelphia and Reading Railroad has more serious accidents reported than any old road in the country. For the month of September alone six serious accidents were reported, five of them collisions of trains. This was the direct result of an inefficient service, and causes that are to degrade the service still further are likely to make accidents still more frequent. Management of this kind is not economical, for one accident will frequently cause greater expense for damaged rolling stock and injured passengers than would be sufficient, in form of wages, to obtain the service of first-class men.

Car Stove Accidents.

The recent accident on the New York, West Shore and Buffalo Railway, where part of a wrecked passenger train was burned up through a heating stove being wrenched from its fastenings, spreading fire about its inflammable surroundings, draws attention to a serious danger which most of our trains continue to be subject to. Some of the most appalling accidents known to American railroad history have resulted from fires started by car stoves getting broken through derailments of trains and setting fire to the cars. Most of these calamities have been followed by a storm of public indignation against railroad companies for not using less dangerous means of heating their cars, but gradually the feeling of resentment and insecurity subsides, and railroad companies continue to heat their highly inflammable cars with cheap cast-iron stoves. These are merely easily broken cast-iron pots, standing in a car, which is a box of wood that is made peculiarly susceptible to fire by being covered with a thick coating of varnish that burns like kerosene; and this danger is in many instances intensified by the spaces between the timbers being packed with shavings.

Minor stove accidents have been of yearly occurrence for forty years, but the first great calamity of this kind happened in 1867, and was significantly known as the "Angola horror." A week before Christmas, when the weather was cold and the car stoves were kept at the highest temperature, the eastern express on the Lake Shore Railroad passed Angola, a way station in New York State, without stopping. From some cause the hind truck of the last car in the train jumped off the rails at the siding frog. Some twelve hundred feet further on a bridge spanned a gulley fifty feet deep. No continuous brake was then in use, and the train could not be stopped promptly, so the derailed car reached the bridge while the train was still running at considerable speed. Here the car broke away from the train and went over the bridge into the chasm below, with one end resting on the abutment at a sharp angle. The car instantly took fire. There were supposed to have been forty-four passengers in the car, and only three escaped. The others were suffocated or burned to death.

Five years after the Angola horror had conspicuously proved the danger of the stove, another bad accident of the same kind happened near Prospect, N. Y., on the Buffalo, Corry and Pittsburgh Railroad. The day before Christmas, during a cold snap, when stoves are naturally kept at their hottest, a passenger train went through a trestle work into a ravine thirty feet below. The cars were not so badly smashed as to cause much fatality among the passengers; but before the imprisoned people could scramble out the cars took fire, and nineteen persons lost their lives, mostly by burning.

Passing over comparatively insignificant stove accidents, where less than half-a-dozen persons were roasted alive, we come to the Ashtabula accident of 1876, which, like so many serious occurrences of this kind, happened in the end of December. During the prevalence of a severe snow-storm the Pacific express, on the Lake Shore Railroad, was toiling westward through Ohio, pulled by two heavy locomotives. Near the station of Ashtabula an iron Howe truss bridge spanned a creek seventy feet below the level of the rails. This bridge gave way under the locomotives, and the last engine, with the whole train of eleven cars, were precipitated into the chasm. It was reckoned that close on two hundred persons were on the train. Cars, engine and the broken bridge were piled in an indiscriminate heap, and they had scarcely settled to the bottom of the creek when the stoves set fire to the mass. It will never be known with certainty how many people lost their lives, but it was not less than eighty, and the greater part of them died by burning or suffocation from the smoke.

When a serious railroad accident occurs far from the leading centers of population, it may produce lamentably fatal effects upon its human cargo, yet excite comparatively little attention throughout the country. This was well illustrated in two stove accidents of recent date. On the 13th of January, 1882, an express passenger train coming into New York from the West, on the New York Central Railroad, was stopped on a curve in a deep cutting near Spuyten Duyvil, at the upper part of Manhattan Island. It was said the stoppage was caused by an inebriated legislator amusing himself by pulling open the conductor's valve of the Westinghouse air brake, whose rope attachment was then placed in the water closet. A brakeman, ordered out to protect the train by flagging, failed, as is so often the case, to get away from the rear platform, and a local train that was closely following the express rushed round the curve and dashed into the rear end of the stopped train. Two Wagner sleeping cars were burned up by a fire raised by the fractured heaters, and eight persons lost their lives. Few railroad accidents have been followed by a storm of criticism and abuse equal to that heaped by press and public sentiment upon those who were responsible, directly or indirectly, for this accident. But this outburst was in great measure due to the scene of the accident being close to New York City, which gave newspaper reporters the opportunity to graphically describe the horrors of the occurrence.

About a year later another stove accident happened that proved fatal to about twice the number of persons who died at Spuyten Duyvil, yet little was said or written about it because the scene was away from easy reach of reporters. On the night of January 20, 1883, a passenger train on the Southern Pacific Railroad stopped on the top of a heavy grade at Tehachapi, the summit where the railroad crosses the Sierra Nevada Mountains. This was the point where a change of locomotives was made, and the engine was uncoupled, leaving the train standing partly on the grade. The night was wild and stormy, with strong gusts of wind blowing in fitful paroxysms. The conductor of the train went into the station office to ask for orders, and the brakemen went in to see what was going on, as is their habit. While the guardians of the train were thus absent, it started to back down the steep grade. The question is still unsettled whether the train was started by the force of the wind or by would-be train robbers releasing the brakes. At all events, it ran down, gaining increased momentum every rod, till it attained a terrific velocity, and in rounding a curve the leading car jumped the track, and the others piled above it in a chaotic wreck, which was promptly made a pyre by the broken stoves. The ashes that remained after the fire indi-

cated that at least fifteen persons died in the flames or in the crash. It is doubtful if this accident furnished the subject for a single editorial out of California, although there were dramatic features of the terrible about it that have been seldom witnessed in the worst railroad slaughters.

There is no reason for these accidents recurring, except that railroad companies will not go to the expense of using safe heaters, so long as a long-suffering public will permit them to use the cheap, dangerous stove. The loss of life from stove accidents has been so appalling as to call eloquently for the banishment of the stove, but it holds its own with amazing tenacity. Railroad managers do not act wisely in waiting for the arch calamity, which shall rouse the public to force the stove outside the passenger coach. When that event comes, passions will be aroused that railroad companies are interested in lulling to sleep.

Parties who are working up a new exposure of the Keely motor, say, that the inventor got his ideas first from a species of perpetual motion machine that was built in the Gould & Eberhardt shops, Newark, N. J., about 1867, for Dr. George Q. Prindham. Mr. Eberhardt, speaking of that machine, said; "It was an elaborate affair, with a big cylinder, like the description of Keely's machine. It had a small engine attached to it. He used to put some cyanide of potassium into the pipes and make the thing go, which it would for a short time. Then it would stop, and something would be declared out of order, and the doctor would have to shell out again. Finally my brother gave it up in despair, and would have no more to do with it. It cost him $300 for the making of the machine lever, and for the other parts of it—the patent, and all that—he must have paid out $700 or $800 more. Finally he threw the whole thing up and——"

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(25) **H. H. D., Camden, N. J., who asks** for rules for belting, will find them in an article by Charles A. Hague, in AMERICAN MACHINIST of Sept. 23, 1882.

(26) **G. B., Burlington, Iowa, who asks** for information as to cutting dies for bolt cutters, will find his questions fully answered in an article on "Making and Repairing Dies and Cutting Bolts," by M. D. Luehrs, in the AMERICAN MACHINIST of Oct. 6, 1883.

(27) **J. A. H., Derrick City, Pa., asks:** Can you give me a simple rule for finding the pressure of water in different sizes of pipe, from the head? *A.*—Pressure will be one pound per square inch for every 2.306 feet head, temperature of water being 60°.

(28) **X., Philadelphia, Pa., asks: What** power will a 6-inch belt transmit over a 20-inch pulley, at 80 revolutions per minute? *A.*—If pulleys are of about equal diameter, and not less than about 12 feet apart, the belt should transmit, say, 2½ horse-power.

(29) **F. W., Pekin, Ill., writes:** I am constructing a cast-iron boiler 24" diameter, 38" high, with tubes through the center; 4" water space. What should be thickness of metal to stand a pressure of 75 lbs. per sq. inch? *A.*—Probably ⅛" metal will stand as well as anything. We should not advise the construction of such a boiler. If we were to make it we should make bottom and top of 4" space a semicircle, and not flat, as per sketch.

(30) **A. L. V., Laceyville, Pa., writes:** I want to transmit about 40 horse-power from my planing mill engine to a grist mill situated about 130 feet away. The connection will be about four feet under ground. What is the best way to do it? *A.*—If you must make underground connection, probably a shaft through a tunnel will be the most satisfactory. If you could connect overhead a wire rope would probably be satisfactory and very materially cheaper than the shaft.

(31) **F. R., Newark, N. J. writes:** In metal turning in an engine lathe is it proper to set the tool above, below, or at the center, and if above or below, how much? *A.*—In turning tapers it is necessary to set the cutting edge at the same height as the centers. For straight turning it may be set at, below or above the center, according to the shape of the tool. It is customary to set the tool where it will cut best. In the majority of instances straight turning is done with the tool above the center.

(32) **Apprentice, Crawfordsville, Ind., asks:** Will you give me a rule by which to find the speed of a driven pulley when the speed of the driver is known? *A.*—Multiply the diameter of the driver by its revolutions per minute, and divide the product by the diameter of the driven pulley. Example: Driving pulley, 48" diameter; revolutions, 100 per minute; driven pulley, 18" diameter, required revolutions per minute of driven pulley: 48 multiplied by 100 equals 4,800, and 4,800 divided by 18 equals 266, revolutions of driven pulley.

(33) **H. S., Canandaigua, N. Y., asks:** Is it customary to put in boilers for heating, the water being returned to the bottom of boiler, with no check valve in return pipe? *A.*—The following, from "Baldwin on Steam Heating for Buildings," seems to answer your query: "Check valves are generally used in return pipes where they enter the boiler. Some steam-heaters leave them out on account of the back pressure they cause to the return water; but the practice is very much to be condemned when two or more boilers are connected, as an inequality in draught, or the cleaning of a fire, will make a small difference of pressure between boilers, causing the water to run from one boiler to another."

(34) **C. T., Guttenberg, Iowa, writes:** 1. We have a 26"x26"x6' planer, which we wish to drive from a shaft parallel with the planer. The shaft runs 230 revolutions per minute. Can we drive by means of a pair of friction miters (paper and iron), 16" greatest diameter, 5" face? *A.*—We have no reliable data as to the driving capacity of such wheels, but should think it would be more than sufficient, when the wheels are in good order. At the same time we should recommend something more positive. We think the friction wheels will eventually be troublesome. 2. Is it practicable to conduct the blast from a No. 5 blower through a pipe about 50 feet to a cupola 50" in diameter, or would it be advisable to place the blower at the cupola and transmit the power by means of a wire rope? *A.*—The use of the pipe 50 feet long is perfectly practicable, and is to be preferred to the use of the wire rope. Make as few bends as practicable in the pipe, and have the bends long and easy.

(35) **A., Providence, R. I., asks:** How can I set a riding cut-off of the Meyer type? *A.*—In the Meyer type of cut-off the expansion valve consists of two plates that may be drawn together or separated by means of a right and left hand thread on the valve stem. Sometimes these plates cut-off with their outer, and sometimes with their inner edges. The main valve is set exactly as the valve of a plain slide-valve engine. When the cut-off is by the outer edges of the plates (with no rock arm), the throw of the cut-off eccentric is set exactly, or nearly, opposite the crank. When the cut-off is by the inner edges of the valve, then the throw of the eccentric is set nearly or exactly with the crank; whether it is *exactly* opposite or with the crank depends upon the design of the valve gear. Suppose the cut-off is by the outer edges, which is the most common, then place the cut-off eccentric with its throw opposite the crank and move the engine to quarter-stroke and turn the stem till the valve just cuts off; then try at quarter stroke on the other end, and shorten or lengthen the valve stem (if necessary), so the cut-off will be equal at both ends. If, now, you find by trial that the cut-off will work satisfactorily through its entire range, you may conclude that it is right; if not, you must move the eccentric, experimentally, until you find the place where it gives the best results. The reason why it is recommended to equalize the cut-off at quarter-stroke is, because it is presumed that it will be used more there than anywhere else. As it will not cut-off equal through its entire range, it is better to make it do so where used the most, wherever that may be. When a rock arm that reverses the motion is used, of course the position of eccentric will be the reverse of that given.

BUSINESS SPECIALS

Transient Advertisements, 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Curtis pressure regulator and st'm trap. Jan. 10, p. 11.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Herbert W. T. Jenner, Mechanical Engineer and Solicitor of Patents, 632 F st., Washington, D. C.

The Young Engineer's Own Book, $3. Edw. Meeks, Publisher, 1002 Walnut St., Phila., Pa.

For Sale—26" b. g. drill presses, quick ret'n, bal. spindles, new, modern tools, $150. S. M. York, Clev'd, O.

Power Measured—F. Van Winkle, mechanical engineer, 22 Cortlandt street, New York.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Corresponding agents, able to sell machinery, engaged in large towns. Harris, 12 Cortlandt St., N.Y.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

Universal grinders for lathe-centers, chucks, angles, or cylinders. C. C. Hill, 84 Market st., Chicago, Ill.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Cooper, On the Use of Belting. $3.50. Edw. Meeks, Publisher, 1002 Walnut St., Phila., Pa.

Split Pulleys at low prices, and of same strength and Appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

The "Wax Process" Engravings shown in the AMERICAN MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large; prices low. Frasse & Co., 62 Chatham St., N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

Improved Tack Machinery, made by The Willets Man'f'g Co., can be seen in operation at their works, 57 Clifford St., Providence, R. I.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

Locomotive Engine Running. By Angus Sinclair. Price, $2. A handsome, interesting book. Just the thing for a holiday gift. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Brass workers' estimates wanted for making patented article of sheet, bar, and cast brass; weight, 9 lbs. Wm. Childs & Co., 114 Water St., N. Y. Canada patent for sale.

EXTRACTS FROM CHORDAL'S LETTERS, 400 pages, 12mo., handsomely bound in cloth. New and enlarged edition, with over 50 illustrations. Price $2. Published by John Wiley & Sons, 15 Astor place, New York.

MANUFACTURES.

S. Bucki & Son, Ellaville, Fla., are building car works.

A machine shop is being fitted up by the Acme Iron Works, St. Johnsbury, Vt.

John Adams, 17th and Indiana Streets, Philadelphia, will erect a factory 50x112 feet.

Holland & Averill, Hallowell, Me., will erect a building for a steam hosiery factory.

William Steele, 2141 Howard Street, Philadelphia, has a building permit to erect a factory 60x98 feet.

W. H. Kehoe & Company, Savannah, Ga., whose foundry was recently burned out, will rebuild and refurnish.

Jerome Maltz & Company are building shops at Williamsport, Pa., to manufacture wood-working machinery.

Rick Brothers, Reading, Pa., are about to erect a three-story brick building for an iron foundry, to cost $10,000.

The Kimbark Buggy Manufacturing Company have decided to remove from South Bend, Ind., to Quincy, Mich.

The Stifel Brewery Company, St. Louis, Mo., will erect a five-story machine house, to cost $20,000, on West 14th Street.

S. Liebmann's Sons, Forrest and Bremen Streets, Brooklyn, N. Y., will erect a five-story brick brewery 72x62 feet, to cost $14,000.

The mill owners of Lancaster and Northboro, Mass., have issued notices forbidding their employes to use intoxicating liquors.

The Wood Carriage Company has been incorporated at Grand Rapids, Mich., by Arthur Wood and Charles A. Wood. Capital, $30,000.

Four or five car works are projected in the South—one at Harper's Ferry, one at Wheeling, one at Chattancoga, and one at Danville, Va.

The Wilkesbarre (Pa.) Lace and Silk Factory has been incorporated with $40,000 capital. They have engaged a brick building to use as a factory.

The machine shops of the Sheffield and Birmingham Railroad, to be constructed during the next 12 months, are to be erected at Sheffield, Ala.

The Winchester Arms Company, of New Haven, are receiving six enormous drop hammers, to be employed in the forging of bayonets and locks for rifles.

Moorehouse Brothers, 13th and Buttonwood Sts., Philadelphia, Pa., are building a brick extension to their machine shops on Bridge Street, Bridesburg, 60x40 feet.

Pancoast & Maule, 245 South Third Street, Philadelphia, Pa., have put a new gas and steam fitter's union on the market, so constructed as to require no packing or preparing whatever to make a perfect and permanent joint.

The Millersburg Agricultural Works, Millersburg, Pa., have been incorporated to manufacture agricultural implements. Capital, $10,000. Simon S. Bowman is Treasurer.

McMurray & Stoughton, Hartford, Conn., have leased the foundry and patterns of the late Hartford Engineering Company, and will do a general foundry business.

The St. Louis *Post Dispatch* has made a canvass of the workshops and mills of that city, and concludes that there are 15,000 persons out of employment, most of them skilled.

John J. Schillinger, manufacturers of artificial stone for pavements and sidewalks, 420 E. 92d St., New York, will erect a factory of brick, four stories high, to cost $15,000.

The Knights of Labor have purchased the Bushong Furnace property in Williamsport, Pa., and will erect thereon machine shops to be worked on the co-operative plan.

Radway & Company, 32 Warren Street, New York, will erect a patent medicine factory at 55 Elm Street, to cost $14,000. The building is to be 26x84 feet, five stories high.

The Jefferson Iron and Steel Company has been organized at Birmingham, Ala., to manufacture iron and steel. The Sloss Furnace Company have an interest in the enterprise.

The Deane Steam Pump Company, Holyoke, Mass., have just issued a miniature catalogue 1½" x2¼", complete in all its details. It is illustrated by ten engravings of pumps.

The Beaver Falls (Pa.) Chemical Company are erecting large works, to cost, with machinery complete, $100,000. The same company has chemical works in Cleveland, O., and other places.

Eaton & Holmes have commenced the manufacture of tacks at Bridgewater, Mass. Their factory is located on the site of the old shoe factory, is 30x50 feet in size, and one-story high. They have put in five tack machines.

The Ohio and Mississippi Railroad (line from Cincinnati to St. Louis), will break ground for three new shops at different points along their line early in the spring. They will require considerable machinery. George E. Atwood, Cincinnati, Ohio, is the purchasing agent.

The Lidgerwood Manufacturing Company, 96 Liberty St., New York, have taken orders from Brown, Howard & Company, contractors for the new aqueduct in New York city, for four large tubular boilers, also two double hoisting engines, buckets, sheaves, and other belongings.

The Southwark Foundry and Machine Company, of Philadelphia, have issued a quarto illustrated catalogue of their Porter-Allen and Southwark engines, blast furnace and blowing engines, steam pumps and pumping machinery and sugar machinery. The engravings are large, and the descriptions concise.

W. F. & John Barnes Company, Rockford, Ill., have issued a new illustrated catalogue of their foot power machinery and tools which have become popular throughout this country. Lathes, sewing machines, tenoning machines, boring machines and attachments, formers, grinding and polishing machines are among their specialties. They also make lathes and drills for power.

The Dickson Manufacturing Company, Scranton, Pa., are building ten pairs of hoisting engines for Brown, Howard & Company, contractors for the new aqueduct for New York City. They range from 10"x12" up to 13"x18". They are building an auxiliary shifting apparatus for cars on the Brooklyn Bridge. They have recently begun to manufacture Leslie's rotary snow plow for railroads, illustrated a few weeks ago in the AMERICAN MACHINIST.

Norton Brothers, 36 to 46 River Street, Chicago, in addition to their present business, as conducted in their Chicago factory, have taken a six years' lease, with privilege to purchase, of a three-story factory at Maywood, Ill., 8 miles out of Chicago, on the line of the Chicago and Northwestern Railway, and are fitting it up with machinery for the construction of Norton's automatic can-making machinery, and also for the manufacture, on a large scale, of cans made by such machinery. The main building is 240x110 feet, and total floor space occupied will be about 8,500 feet. About 20 machinists will be employed.

The Billings & Spencer Company, Hartford, Ct., have just issued a new illustrated 80-page catalogue and price list of their drop-forged machinists' tools, and other specialties in drop-forgings. As noted in the preface, "The drop-forging business is followed by very few concerns in the world, and there are none in the United States making in any comparison the amount and variety made by this company." In addition to the forge shop, which is provided with 27 drop hammers, ten presses, one atmospheric and four Ult hammers, there is a fully-equipped machine shop, and several smaller buildings devoted to the business of the company. Upwards of 3,000 different articles for parts of guns, pistols, sewing machines, special machinery, machinists' tools, sewing machine shuttles, etc., are among the drop-forgings. A large variety of machinists' tools are put upon the market in a finished state. One hundred men are employed by the company.

The Chicago Steel Company have recently placed some good-sized orders for agricultural steel wheels, and propose to build works in the near future. The present works will be temporarily enlarged.—*Industrial World.*

Among the new railroad shops to be erected this year are those of the Mississippi Valley Railroad at Vicksburg, Miss.; Alabama Great Southern, Birmingham, Ala.; Atlantic & Danville, Fairmount, Va.; Chesapeake & Nashville, at Nashville, Tenn.; East Tenn., Va. & Ga., at Rome, Ga. (now building), at Atlanta, Ga.; Georgia Pacific, Birmingham, Ala. (round-house); Texas Pacific, Fort Worth, Tex. Additions and improvements are to be made to several other railroad shops.

The Pacific Mills, of Lawrence, Mass., is the largest textile manufacturing corporation in the world. Its capital stock is $2,500,000, owned by 385 stockholders. It has 23 buildings, covering 44 acres of floor space. The annual consumption of cotton is 15,600 bales, and of wool 4,000,000 pounds. The annual capacity of the mills is 65,000,000 yards of cotton, printed and dyed, and 35,000,000 yards of worsted goods; they employ 3,600 females, and 1,900 males. The pay-roll for the year ending March, 1884, amounted to $1,790,000.—*Springfield Republican.*

Machinists' Supplies and Iron.

NEW YORK, January 8, 1885.

The conversation of dealers regarding the condition of business is very despondent. The depression of the early part of last year was borne with fortitude under the encouragement oft-repeated that a Presidential year was always dull, anyhow, and that things would mend after the election was over. When that time came, bringing no improvement, the period of revival was put off to the beginning of the year, and now when the year is a week old and still no improvements materialize, those interested are disposed to feel gloomy.

Steam supplies and boilermakers' material appear to be as much depressed as the machinist supply business.

Iron—The market for pig remains in the same condition so often reported. Very little business has been done during the week, and that has been strictly confined to small dealers. Large dealers have nearly all contracted several months ahead on current low prices—an indication that they believe the bottom has been reached. Standard Lehigh and North River brands of No. 1 X Foundry at tidewater are quoted $19 to $19.50; No. 2 X, $18 to $18 50; Grey Forge, at furnace, $14.50 to $15 50.

Scotch Pig—The demand for this iron remains extremely limited, with no improvement. The sales are mostly small, at irregular prices, quotations being entirely nominal. Shotts is quoted at $21 50 to $21 75, to arrive; Coltness, $21.50 to $21.75, to arrive; Glengarnock, $19.50, to arrive; Gartsherrie, $22 50; Summerlee, $20.50; Cambroe, $19, to arrive; Eglinton, $18.50; Langloan, $21; Dalmellington, $19.

Copper—The market for ingot has ruled quiet and prices nominal. Sales have been made as low as 10 80c, although quotations for Lake are 11¼c. Baltimore and other brands are quoted at 10¾ to 10⅝c., but sales are not made on these figures.

Lead—The market for common pig has ruled quiet and steady at 3.62½c., with very little new business.

Tin—This market is slightly firmer than it was when our last report was made, holders asking higher prices. We quote for jobbing lots, Banca, 19c; Straits and Malacca, 16½c.

WANTED

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Situation to go South to erect and run heavy machinery. Address Grace, AM. MACHINIST office.

Wanted—Position as draftsman or superintendent, by an ingenious and reliable practical mechanic. A. B, 279 4th Av. N. Y.

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An experienced engineer desires a position as chief draftsman or superintendent. Address N. S. S., AM MACHINIST.

Wanted—A foreman to take charge of an iron foundry in locomotive work. Address L. W., AM. MACHINIST, with reference, age, experience, and where last employed.

First-class patternmaker wants position as foreman 18 years experience—8 as foreman. Thoroughly understands foundry work and drawing; Highest references. Address "Energy," care AM. MACHINIST.

Wanted—Position as manager, superintendent or designer, by Mechanical Engineer who has has had a technical education and ten years' practical experience in mechanical work and the above positions. Best references. Ad Box 15, AM. MACHINIST.

New Patent—great value to iron workers—for sale cheap. Tuttle & Sheldon, 265 Broadway, N.Y.

For Sale—Our Worthington duplex steam pump, nearly new, in perfect order, size 4½ x 2¾ x 4. Will be sold low if applied for soon. Address Wm. H. Clapp, Weymouth, Mass.

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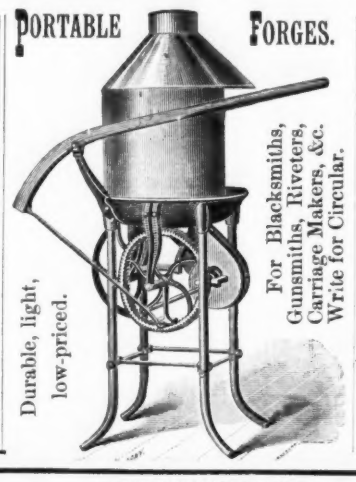

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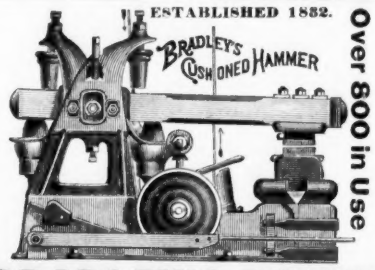

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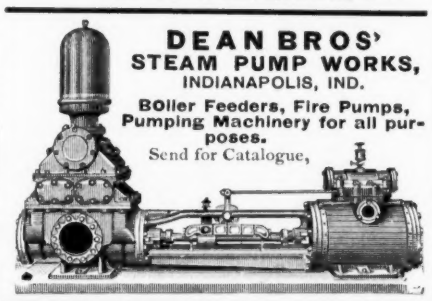

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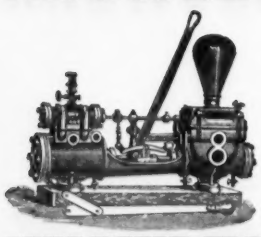

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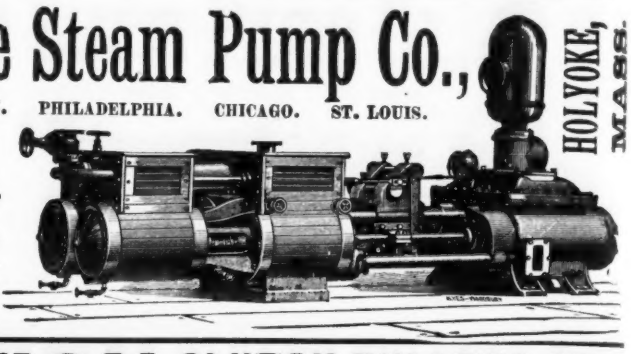

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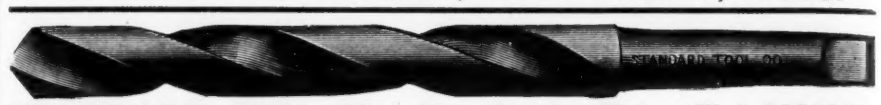

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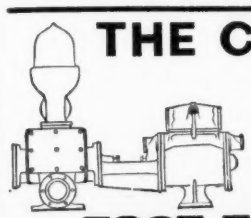

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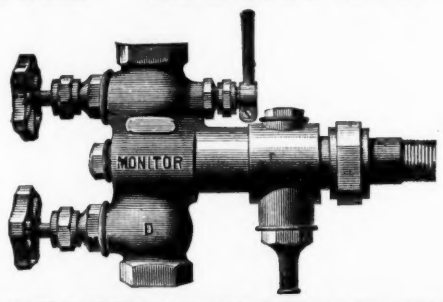

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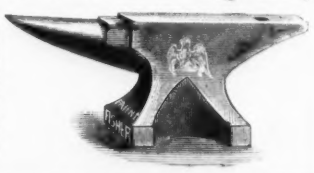

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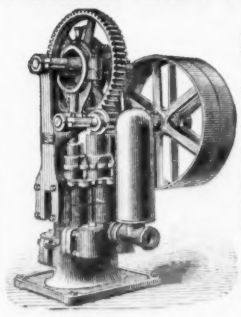
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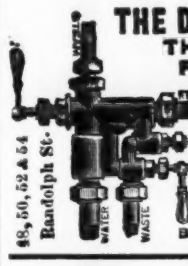

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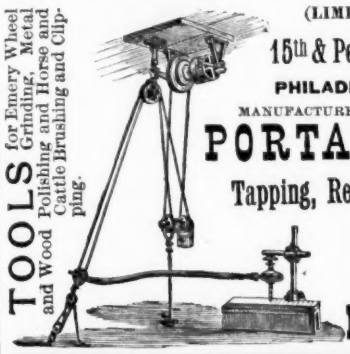
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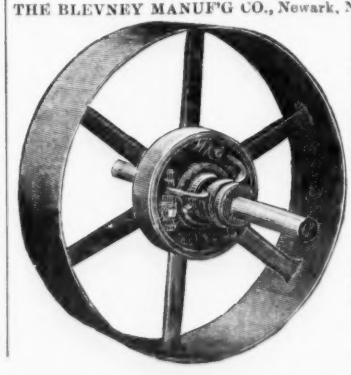
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" 10	1 1-2 "	1.10
" 11	1 3-4 "	1.10
" 12	2 "	1.25
" 13	2 1-4 "	1.40
" 14	2 1-2 "	1.60
" 15	3 "	1.60
" 16	3 1-2 "	1.80
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Full set, 19 dogs,		3.50
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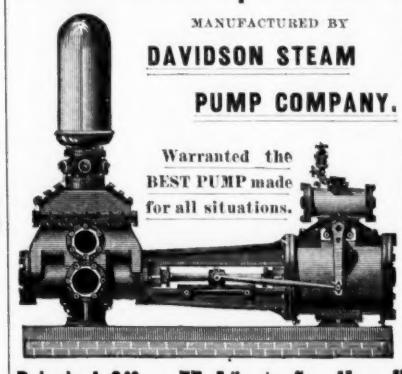
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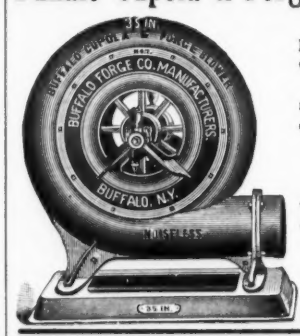

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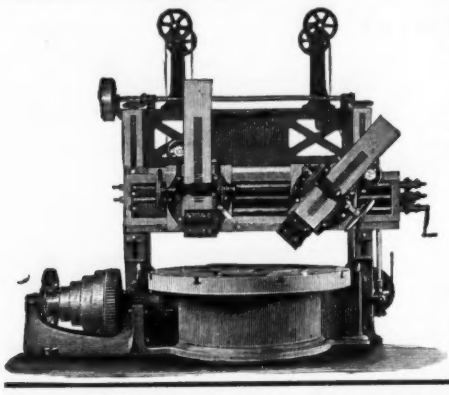

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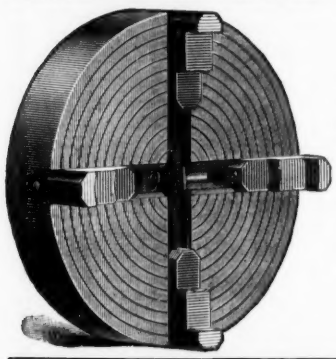

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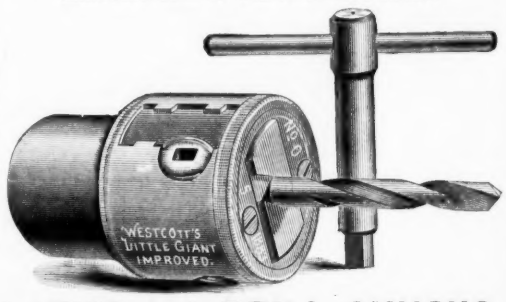

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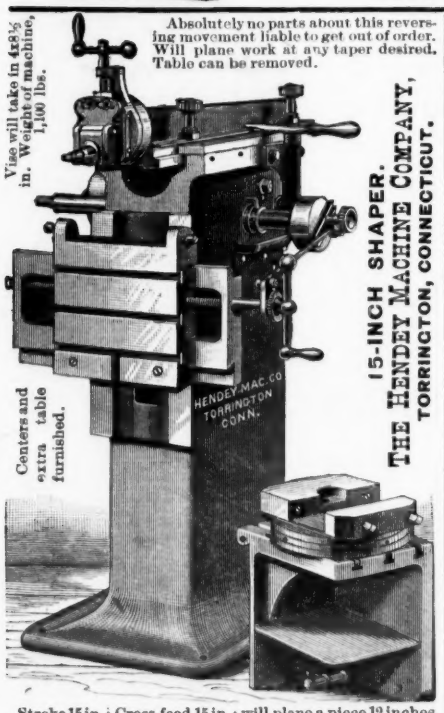

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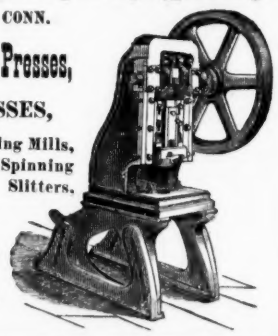

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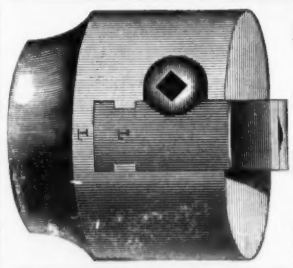

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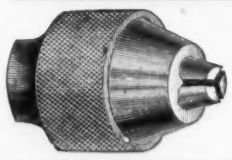

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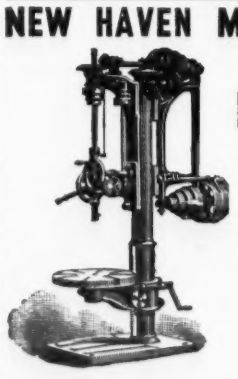

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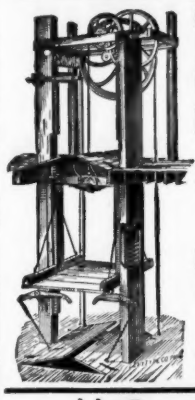

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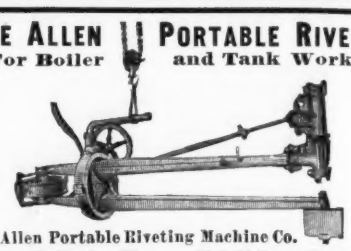

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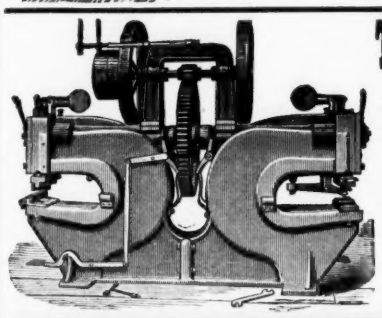

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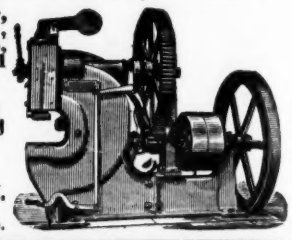

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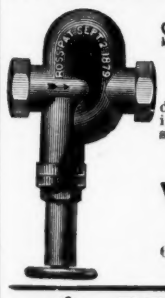

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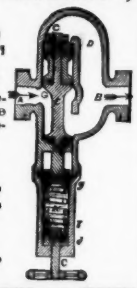

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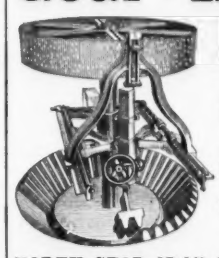

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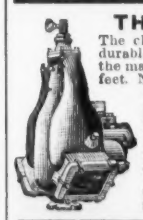

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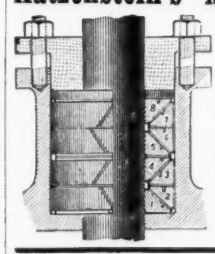

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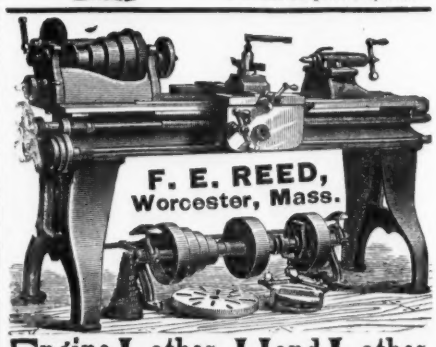

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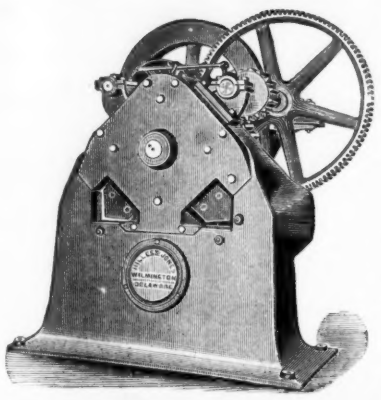

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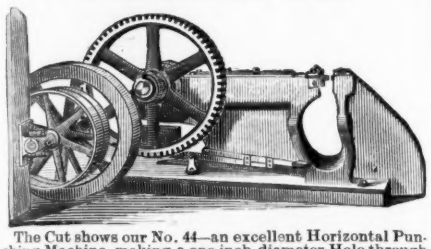

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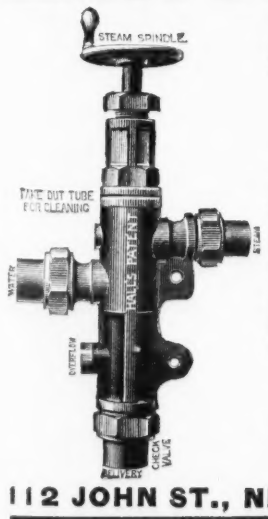

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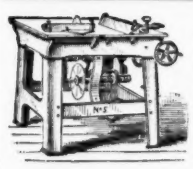

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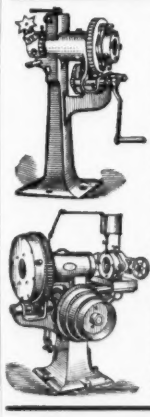

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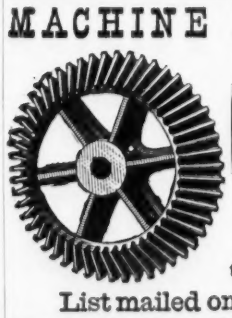

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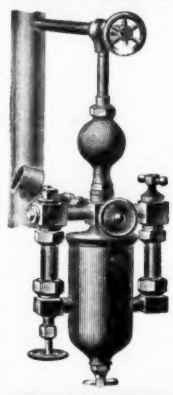

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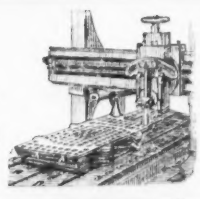

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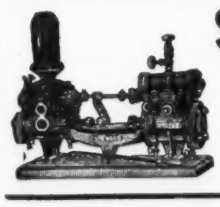

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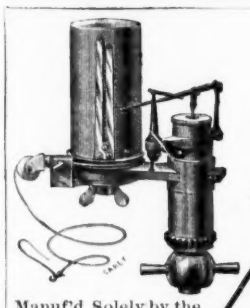

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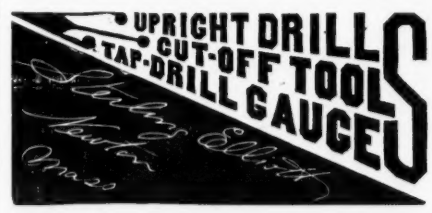

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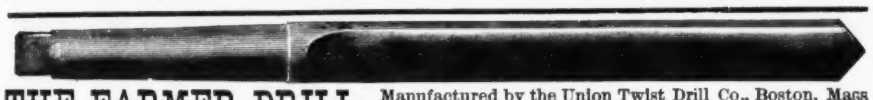

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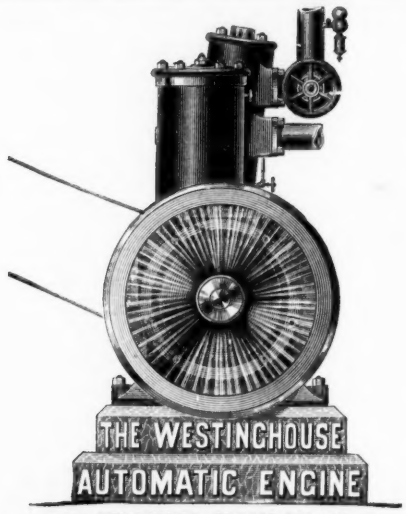

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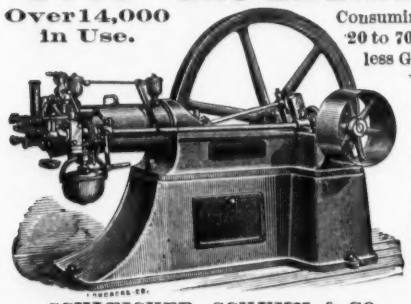

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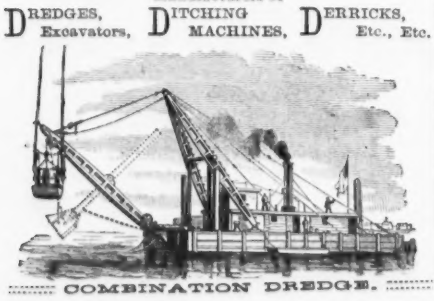

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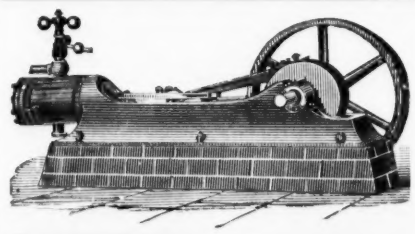

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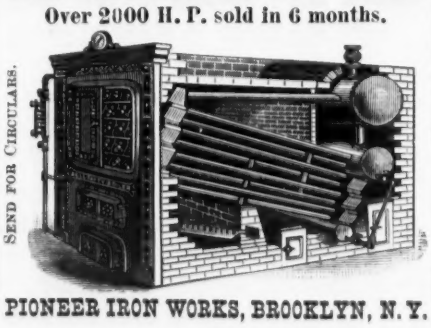

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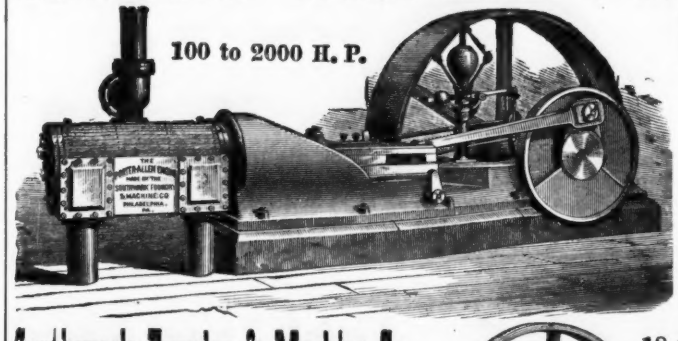

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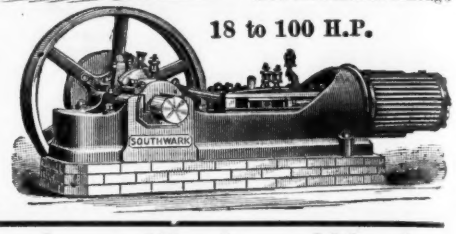

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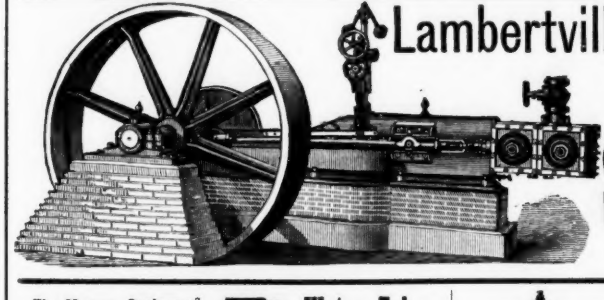

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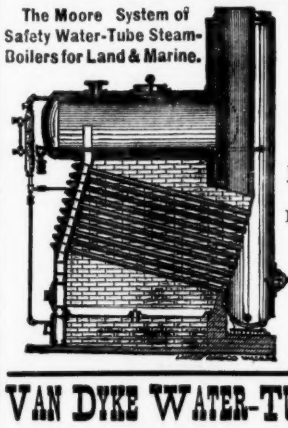

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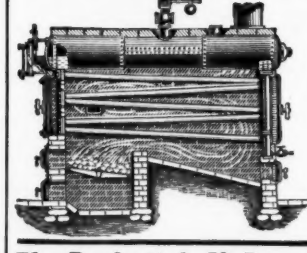

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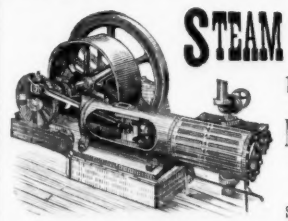

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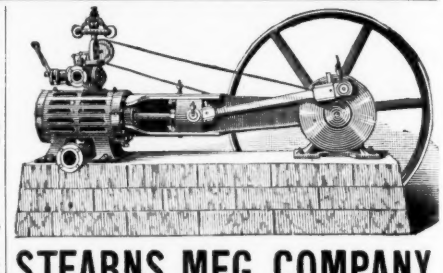

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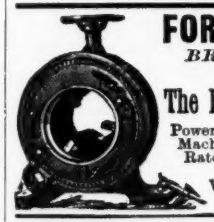

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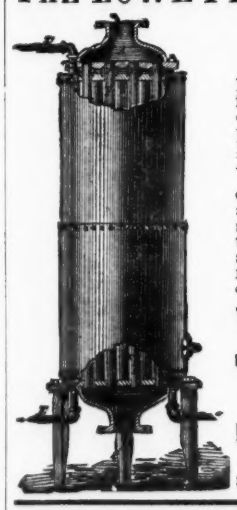

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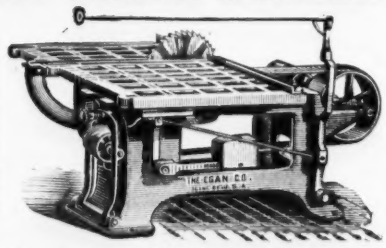

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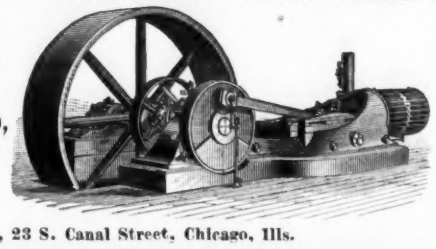

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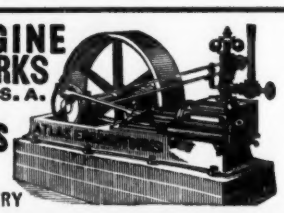

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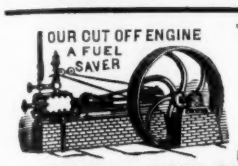

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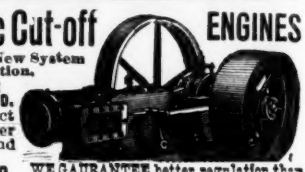

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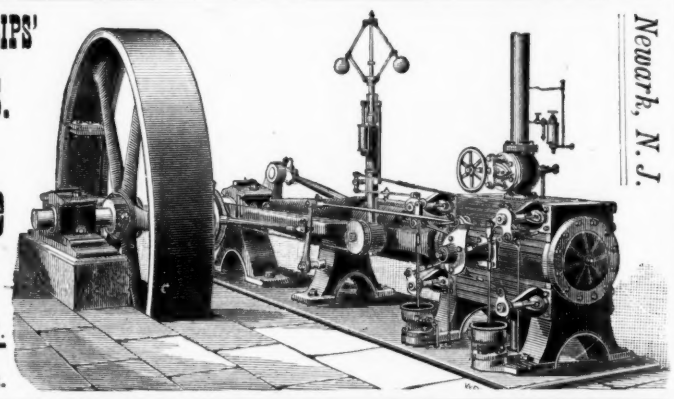

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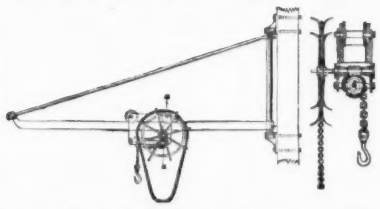

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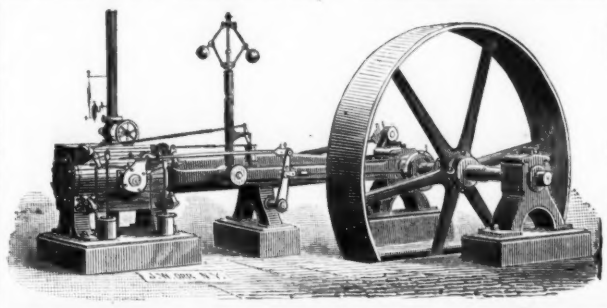

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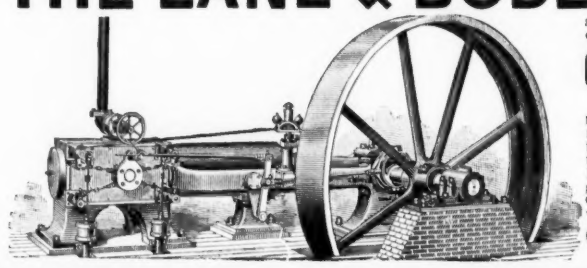

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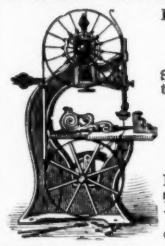

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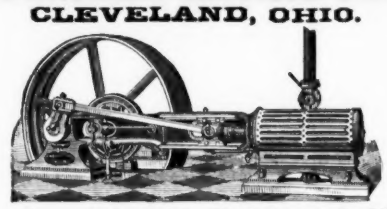

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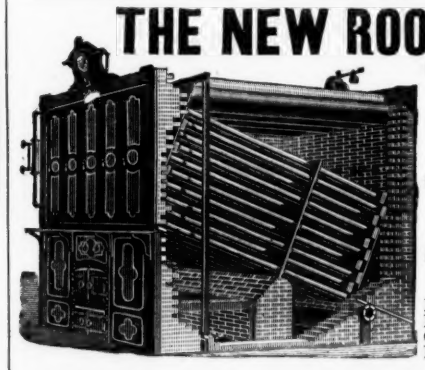

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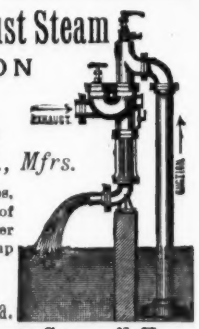

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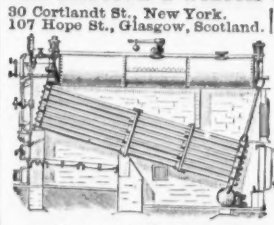

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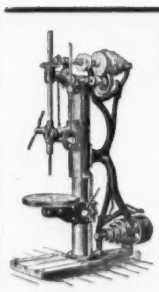

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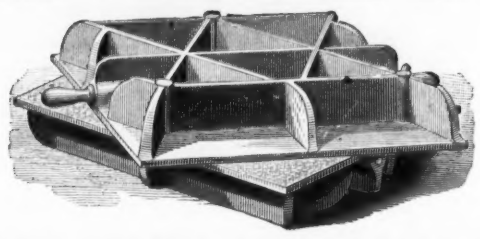

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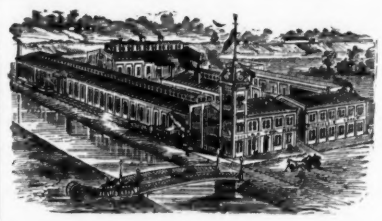

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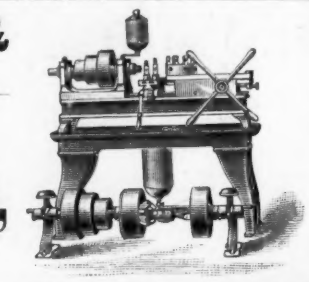

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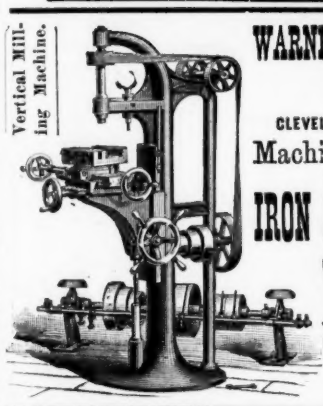

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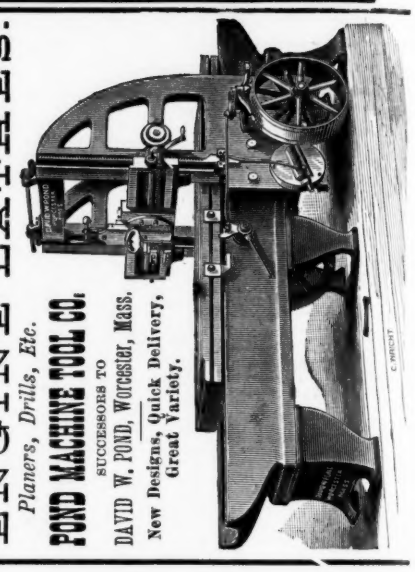

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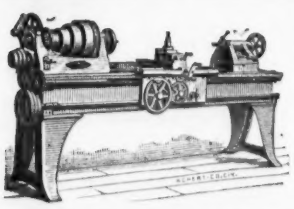

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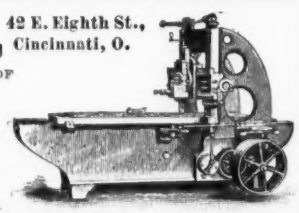

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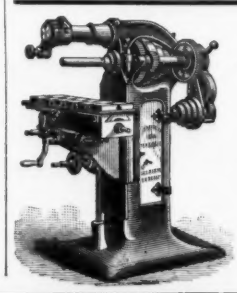

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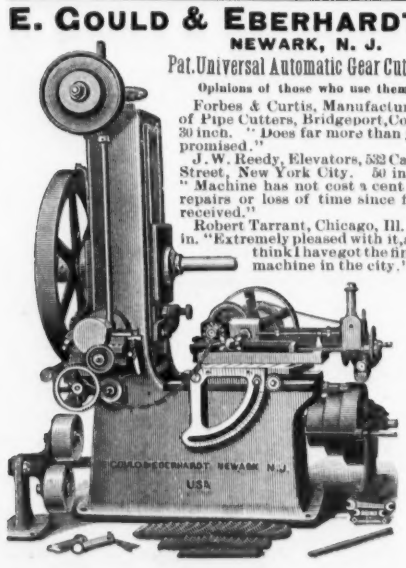

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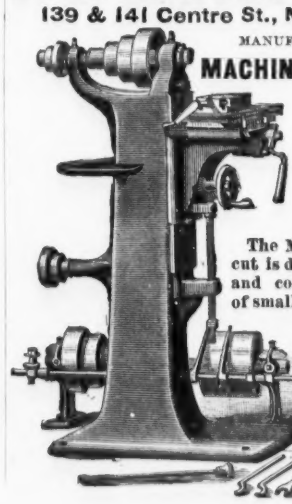

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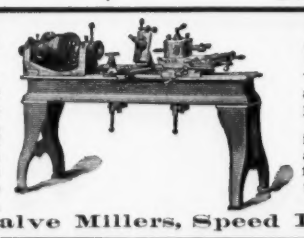

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